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PROJECT MEETINGS

1. GENERAL

1.1 Administrative

.1 Participate in scheduled meetings in the Winnipeg area, on a minimum monthly basis throughout the progress of the work. Coordinate location with the Contract Administrator.

.2 Participate in scheduled meetings, at the Shoal Lake site at scheduled construction inspection dates determined by the Contract Administrator. A minimum of three (3) such visits are anticipated during the construction and testing phases.

.3 Submit any agenda items for meetings.

.4 Coordinate with the City for use of physical space and make arrangements for meetings held at Site.

.5 Contract Administrator will preside at meetings.

.6 Contract Administrator will record the meeting minutes, and include significant proceedings and decisions, and identify actions by parties.

.7 Contract Administrator will reproduce and distribute electronic copies of minutes within five (5) Business Days after meetings and transmit to meeting participants and, affected parties not in attendance, electronically.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

.9 Contractor will be responsible to provide above services at any additional meetings where Contract Administrator has not been requested to participate by the City.

1.2 Preconstruction Meeting

.1 Within fifteen (15) Business Days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Contract Administrator, Contractor, major Subcontractors, field inspectors, supervisors and the City will be in attendance.

.3 Establish time and location, in Winnipeg area, of meeting and notify parties concerned minimum five (5) Business Days before meeting.

.4 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.

.5 Delivery schedule and logistics for specified equipment in accordance with E5 – Use of GWWD Railway.

.6 Site travel, meals and accommodations arrangements, in accordance with E4 – Staffhouse Accommodations.

.7 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures, and Part F – Security Clearances.

.8 Procedures for proposed changes, change orders, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements in accordance with the General Conditions.

.9 City provided products.

.10 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.11 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.12 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals, the General Conditions, and the Supplemental Conditions.

.13 Monthly progress claims, administrative procedures, photographs, hold backs in accordance with the General Conditions, and the Supplemental Conditions.

.14 Appointment of inspection and testing agencies or firms.

.15 Insurances, transcript of policies, in accordance with the Supplemental Conditions.

1.3 Progress Meetings

.1 During course of Work participate in monthly progress meetings scheduled by Contract Administrator. Meeting frequency may be adjusted based on schedule progress and general construction requirements.

.2 Contractor, major Subcontractors involved in Work and Contract Administrator and City are to be in attendance.

.3 For Contractor originated meetings, notify parties minimum three (3) Business Days prior to any such meetings.

.4 For Contractor originated meetings, record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) Business Days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

SUBMITTAL PROCEDURES

1. GENERAL

1.1 Administrative

.1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present Shop Drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract is not relieved by Contract Administrator review.

.10 Keep one (1) reviewed copy of each submission on Site.

1.2 Shop Drawings and Product Data

.1 Submit Drawings stamped and signed by Professional Engineer registered or licensed in the Province of Manitoba where required by provincial requirements or those of the Authority Having Jurisdiction, or specified by these documents.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow five (5) Business Days for Contract Administrator's review of each submission.

.4 Adjustments made on Shop Drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.5 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.

.6 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and Bid Opportunity number.

.3 Contractor's name and address.

.4 Identification and quantity of each Shop Drawing, product data and sample.

.5 Other pertinent data.

.7 Submissions include:

.1 Date and revision dates.

.2 Project title and Bid Opportunity number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.

.2 Layout, showing dimensions, including identified field dimensions, and clearances.

.3 Setting or erection details.

.4 Capacities.

.5 Performance characteristics.

.6 Standards.

.7 Operating weight.

.8 Wiring diagrams.

.9 Single line and schematic diagrams.

.10 Relationship to adjacent work.

.8 After Contract Administrator's review, distribute copies.

.9 Submit one (1) electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.

.10 Submit one (1) electronic copy of test reports for requirements requested in specification Sections and as requested by Contract Administrator.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within three (3) years of date of contract award for project.

.11 Submit one (1) electronic copy of certificates for requirements requested in Specification Sections and as requested by Contract Administrator.

.1 Statements printed on Manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.12 Submit one (1) electronic copy of Manufacturer’s instructions for requirements requested in Specification Sections and as requested by Contract Administrator.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.13 Submit one (1) electronic copy of Manufacturer's Field Reports for requirements requested in Specification Sections and as requested by Contract Administrator.

.14 Documentation of the testing and verification actions taken by Manufacturer's Representative to confirm compliance with Manufacturer's standards or instructions.

.15 Submit one (1) electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Contract Administrator.

.16 Delete information not applicable to project.

.17 Supplement standard information to provide details applicable to project.

.18 Shop Drawings will be reviewed by the Contract Administrator and returned with one of the following comment:

.1 Reviewed No Comment: the information presented appears consistent with the requirements.

.2 Reviewed as Noted: Notes have been added to represent the reviewer's understanding, assumptions or information to be included in the closeout submissions.

.3 Revise and Resubmit: resubmission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 Samples

.1 Not used.

1.4 Mock-Ups

.1 Not used.

1.5 Photographic Documentation

.1 The City security requirements must be met prior to taking and use of any photos. All proposed photos will be discussed with site personnel and reviewed by the City prior to photos being taken, leaving site or being made available for use in any of the Contractor's documentation.

.2 Submit one (1) electronic copy of colour digital photography in jpg format, standard resolution as directed by Contract Administrator. Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints:

.1 Viewpoints and their location as determined by Contract Administrator.

.4 Frequency of photographic documentation: as directed by Contract Administrator.

.1 Upon completion of: excavation, foundation, framing and services before concealment, of Work, and as directed by Contract Administrator.

1.6 Certificates and Transcripts

.1 The Contractor shall not commence any Work on the Site until the Contract Administrator has confirmed receipt and approval of:

.1 Evidence that the Contractor is in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba;

.2 Evidence of the workers compensation coverage specified in C6.15;

.3 The Safe Work Plan specified in D9;

.4 Evidence of the insurance specified in D10;

.5 The performance security specified in D11;

.6 The Subcontractor list specified in D12;

.7 The security clearances specified in Part F – Security Clearances for each individual proposed to perform Work under the Contract;

.8 The detailed work schedule specified in D13;

.9 The Environmental Protection Plan specified in specification section 01 35 43; and

.10 Completed Form N: Licensed Petroleum Technician List specified in B13.3(e).

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

HEALTH AND SAFETY REQUIREMENTS

1. GENERAL

1.1 References

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

.3 Province of Manitoba

.1 The Workers Compensation Act C., C.S.M. c.W200.

.4 City of Winnipeg – Materials Management web site – Workplace Safety and Health Program for Contractors

1.2 Action and Informational Submittals

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within at least five (5) Business Days prior to the commencement of any Work on Site but in no event later that the time specified in the General Conditions for the return of the executed Contract. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation, found in work plan.

.3 Submit one (1) electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Contract Administrator and to authority having jurisdiction, weekly.

.4 Submit copies of reports or directions issued by Federal, Provincial and City health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS SDS.

.7 The Contract Administrator will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 calendar days after receipt of plan. Revise plan as appropriate and resubmit plan to Contract Administrator within 7 calendar days after receipt of comments from Contract Administrator.

.8 Contract Administrator review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Contract Administrator.

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.1 A helicopter landing pad is located at the Site in the event a helicopter evacuation is required.

.2 An emergency evacuation for a nonlife threatening injury will require the coordination with the EMS to an appropriate pick up location along the GWWD railway.

.3 When 911 is called from a Site LAN line request the operator to transfer the call to the provincial 911 system.

1.3 Filing of Notice

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 Safety Assessment

.1 Perform site specific safety hazard assessment related to project.

1.5 Meetings

.1 Schedule and administer Health and Safety meeting with Contract Administrator prior to commencement of Work.

1.6 Regulatory Requirements

.1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.7 Project/Site Conditions

.1 Work at Site may involve contact with:

.1 Wildlife

.2 Sodium hypochlorite (12.5%) stored on site and in use during the warmer temperatures.

.3 Open water.

.4 Confined space entry.

.5 Medium and low voltage distribution systems.

.6 Remote work location.

.7 As identified in the site briefings provided by the City.

1.8 General Requirements

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning Work and continue to implement, maintain, and enforce plan until final demobilization from Site. Health and Safety Plan must address project specifications.

.2 Contract Administrator may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.9 Responsibility

.1 Be responsible for health and safety of persons on Site, safety of property on Site and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.10 Compliance Requirements

.1 Comply with The Workers Compensation Act, and The Workplace Safety and Health Act., Manitoba Reg.

1.11 Unforeseen Hazards

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Contract Administrator verbally and in writing.

1.12 Health and Safety Co-Ordinator

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience specific to activities associated with petroleum works in environmentally sensitive areas.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter Site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.13 Posting of Documents

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Contract Administrator.

1.14 Correction of Non-Compliance

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Contract Administrator.

.2 Provide Contract Administrator with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Contract Administrator may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 Powder Actuated Devices

.1 Use powder actuated devices only after receipt of written permission from Contract Administrator.

1.16 Work Stoppage

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

ENVIRONMENTAL PROCEDURES

1. GENERAL

1.1 References

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to Site, provide Environmental Protection Plan for review and approval by Contract Administrator.

.3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.5 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from Site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations, EPA 832/R-92-005, Chapter 3 requirements.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on Site.

.7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.8 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on Site.

.11 Contaminant Prevention Plan identifying potentially hazardous substances to be used on Site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.12 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 Fires

.1 Fires and burning of rubbish on Site are not permitted.

1.4 Work Adjacent To Waterways

.1 Construction equipment to be operated on land only.

.2 Do not use waterway beds for borrow material.

.3 Waterways to be free of excavated fill, waste material and debris.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

.6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

1.5 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

1.6 Historical/Archaeological Control

.1 Provide historical, archaeological, cultural resources biological resources plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, known to be on Site: and/or identifies procedures to be followed if historical archaeological, or

cultural resources not previously known to be on Site or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and the Contract Administrator.

.3 Any excavation beyond the building footprint of the Pumphouse and Gatehouse may be impacted by cultural and/or archaeological sensitive areas.

1.7 Notification

.1 Contract Administrator will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Contract Administrator of proposed corrective action and take such action for approval by Contract Administrator.

.1 Do not take action until after receipt of written approval by Contract Administrator.

.3 Contract Administrator will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling.

.3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

END OF SECTION

REGULATORY REQUIREMENTS

1. GENERAL

1.1 References and Codes

.1 Perform Work in accordance with most current versions of:

.1 Manitoba Building Code.

.2 Manitoba Fire Code.

.3 Manitoba Plumbing Code.

.4 CSA B139 Series 15 Installation Code for Oil Burning Equipment.

.5 The Dangerous Goods Handling and Transportation Act C.C.S.M. c.D12, as amended by Manitoba Regulation 188/2001.

.6 The Workplace Safety and Health Act, C.C.S.M. c W210.

.2 Meet or exceed requirements of:

.1 Specified standards, codes and referenced documents, and those included by the above documents.

1.2 Hazardous Material Discovery

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Contract Administrator.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Contract Administrator.

.3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Contract Administrator.

1.3 Building and Site Smoking Environment

.1 Comply with smoking restrictions and municipal by-laws.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

QUALITY CONTROL

1. GENERAL

1.1 Inspection

.1 Further to C11, give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator instructions, or law of Site.

1.2 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies will be engaged by City for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the City.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to City or Contract Administrator. Pay costs for retesting and reinspection.

1.3 Access to Work

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 Procedures

.1 Notify appropriate agency and Contract Administrator in advance of requirement for tests, in order that attendance arrangements can be made.

1.5 Reports

.1 Submit one (1) electronic copy of inspection and test reports to Contract Administrator.

.2 Provide copies to subcontractor of work being inspected or tested.

1.6 Mill Tests

.1 Submit mill test certificates as requested or required of specification Sections.

1.7 Equipment and Systems

.1 Submit adjustment and balancing reports for mechanical and electrical systems.

.2 Refer to each Section for definitive requirements.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

TEMPORARY UTILITIES

1. GENERAL

1.1 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.2 Installation and Removal

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from Site all such work after use.

1.3 Water Supply

.1 The City will provide continuous supply of water for construction use.

1.4 Temporary Heating and Ventilation

.1 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.2 Maintain temperatures of minimum 10°C in areas where construction is in progress.

.3 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.4 Permanent heating system of building may be used when available and approved by the Contract Administrator. Be responsible for damage to heating system if use is permitted.

.5 On completion of Work for which permanent heating system is used, replace filters.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 Temporary Power and Light

.1 Contractor will be allowed to connect to a restricted amount of site electrical power for temporary lighting and operating of power tools, but must confirm requirements and obtain site approval from Contract Administrator personnel prior to mobilization.

.2 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Contract Administrator provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than three (3) months.

1.6 Temporary Communication Facilities

.1 The Contractors shall provide and pay for any temporary equipment necessary for own use and intermittent use of Contract Administrator. Access to Systems is typically via satellite only.

1.7 Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and by-laws.

.2 Burning rubbish and construction waste materials is not permitted on site.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

CONSTRUCTION FACILITIES

1. GENERAL

1.1 Related Requirements

.1 Not used.

1.2 References

.1 Canadian Standards Association (CSA)

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA-O121, Douglas Fir Plywood.

1.3 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Scaffolding

.1 Scaffolding in accordance with The Workplace Safety and Health Act, Part 28.

.2 Provide and maintain scaffolding, ramps, ladders, platforms, temporary stairs, and all similar systems required for the work and inspections in progress.

1.5 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Confirm availability and conditions of use of site equipment for these works.

.3 Hoists and cranes to be operated by qualified operator.

1.6 Site Storage/Loading

.1 Confine work and operations of employees by Contract. Do not unreasonably encumber premises with products.

.2 Confirm availability and conditions of use of Site for storage and general operations during the works.

.3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

.4 Provide and maintain adequate access to Site.

1.7 Offices

.1 Heated office space will be provided by the City.

.2 Provide marked and fully stocked first-aid case in a readily available location.

1.8 Equipment, Tool and Materials Storage

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds or job boxes for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on Site in manner to cause least interference with work activities.

1.9 Sanitary Facilities

.1 Site sanitary facilities may be used by employees. Facilities are to be maintained clean as instructed by the Contract Administrator and City site supervisory personnel.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 Construction Signage

.1 No other signs or advertisements, other than warning signs, are permitted on Site.

.2 Maintain approved signs and notices in good condition for duration of project, and dispose of off-Site on completion of project or earlier if directed by Contract Administrator.

1.11 Protection and Maintenance of Traffic

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Contract Administrator.

.3 Provide measures for protection and diversion of local traffic as required by Site management, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.4 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.5 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.6 Provide snow removal within construction zone during period of Work.

1.12 Clean-Up

.1 Remove construction debris, waste materials, packaging material from Site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

TEMPORARY BARRIERS AND ENCLOSURES

1. GENERAL

1.1 Related Requirements

.1 Not Used.

1.2 References

.1 Not Used.

1.3 Installation and Removal

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from Site all such work after use.

1.4 Dust Tight Screens

.1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.5 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Contract Administrator locations and installation schedule three (3) Business Days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.6 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

COMMON PRODUCT REQUIREMENTS

1. GENERAL

1.1 References

.1 Conform to the reference standards, in whole or in part as specifically requested in Specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, Contract Administrator reserves right to have such products or systems tested to prove or disprove conformance.

.3 Cost for such testing will be borne by Contractor in event of conformance with Contract or by Contractor in event of non-conformance.

1.2 Quality

.1 Futher to C6.5, products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Further to C11, defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Contract Administrator based upon requirements of Contract.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 Availability

.1 Immediately upon award of Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with Manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with Manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber, etc. on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

.9 Touch-up damaged factory finished surfaces to Contract Administrator's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 Transportation

.1 Except as specified in 1.5.2, the Contractor shall deliver / receive products to/from the City of Winnipeg, Water and Waste Department’s GWWD Railroad at the location identified in the Bid Opportunity documents.

.2 Products supplied by the City will be delivered to the Contractor at the above location.

.3 The Contractor shall load and secure all products onto the GWWD designated rail vehicles. The City will transport the products from/to the identified location to/from the Shoal Lake Aqueduct Inlet site. The Contractor shall load/unload all products at the Site.

1.6 Manufacturer's Instructions

.1 Unless otherwise indicated in Specifications, install or erect products in accordance with Manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Contract Administrator in writing, of conflicts between Specifications and Manufacturer's instructions, so that Contract Administrator will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Contract Administrator, whose decision is final.

1.8 Co-ordination

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 Concealment

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.10 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Contract Administrator of conflicting installation. Install as directed.

1.12 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 Fastenings - Equipment

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use hexagon heads, semi-finished unless otherwise specified.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 Protection of Work in Progress

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Contract Administrator.

1.15 Existing Utilities

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

EQUIPMENT INSTALLATION

1. GENERAL

1.1 Summary

.1 This Section describes general requirements for all equipment supplied under the Contract relating to factory inspections, equipment delivery, equipment installation training, equipment installation, equipment performance testing, and process performance testing.

.2 Equipment to be delivered to the City of Winnipeg, Water and Waste Department's GWWD Railroad train as indicated in the Bid Opportunity documents, loaded and secured onto the GWWD designated rail vehicles. The City will transport the equipment from this site to the Shoal Lake Aqueduct Inlet site.

.3 The Contractor shall be responsible for the loading and securing the equipment onto the train, and for offloading from the train.

.4 Form 100 - Certificate of Equipment Delivery attached to this specification shall be completed accordingly.

1.2 Related Requirements

.1 Section 01 91 13 – General Facility Operational Review.

.2 Section 21 05 01 – Common Work Results for Mechanical

1.3 References

.1 Conform to the reference standards, in whole or in part as specifically requested in Specifications.

.2 If there is question as to whether products or systems are in conformance with applicable standards, Contract Administrator reserves right to have such products or systems tested to prove or disprove conformance.

.3 Cost for such testing will be borne by Contractor in event of conformance with Contract or by Contractor in event of non-conformance.

1.4 Definitions

.1 Manufacturer's Representative: A Manufacturer's Representative is a trained serviceman empowered by the Contractor to provide:

.1 Installation training.

.2 Witnessing of equipment installation.

.3 Assistance in equipment performance testing.

.4 Assistance in process performance testing.

.5 Participation in the guaranteed performance testing.

1.5 Expertise and Responsibility

.1 The Contract Administrator recognizes the expertise of the Contractor.

.2 Should the Contract Administrator issue a Notice of Proposed Change, Field Order or Change Order to change the Work which would, in the opinion of the Contractor, compromise the success or safety of the Work, then it shall be incumbent on the Contractor to notify in writing the Contract Administrator to this effect within two (2) days upon receipt

1.6 Equipment Delivery

.1 The delivery of all material and equipment shall be coordinated with the City, the Contractor and the Contract Administrator to optimize the amount of trips and the requirement for the material and equipment on site or removed from site.

.2 The Contractor shall deliver all material and equipment required under this Contract to the City of Winnipeg, Water and Waste Department's GWWD designated site as indicated in the Bid Opportunity documents from which the equipment will be transported to the Shoal Lake Aqueduct Inlet site by the City.

.3 The Contractor shall deliver the equipment on or before the specified delivery date. The Contractor shall include a schedule within 15 Calendar Days after notification of acceptance of Shop Drawings.

.4 No delivery to the Site shall occur until Reviewed Shop Drawings are received by the Contractor.

.5 The Contractor shall off-load and place into storage all equipment at the Shoal Lake Intake Facility at the location agreed with the Contract Administrator. The Contractor shall provide off-loading requirements and procedures to the Contract Administrator well in advance of the arrival of the equipment.

.6 The Contractor will be responsible for storing the equipment, appurtenances and materials and for protection against weather, loss, damage or theft. The Contractor shall provide the Contract Administrator with a copy of all instructions in writing of all precautions to be observed in connection with the storing and protection of the equipment.

.7 The Contractor shall clearly mark each item to be shipped and identify and reference it to the packing lists and to bills of materials on the shop drawings. The lists will be used by the Contractor and the Contract Administrator to check the contents of each delivery. No shipments will be off-loaded until itemized packing lists have been received by the parties mentioned herein.

.8 The Contractor shall adequately pack and crate each component to provide protection during transport, handling and storage. Equipment suitable for outside storage will be stored to the satisfaction of the Contractor and the Contract Administrator. The Contractor shall identify each component with durable labels or tags securely attached to each piece of equipment, crate or container.

.9 No item shall be shipped loose or in such a way as to be adversely affected by weather conditions, pilferage, normal transit hazards or other reasonably anticipated shipping hazards.

1.7 Storage

.1 Where the equipment is to be stored on site for any period of time exceeding one week, the Contractor shall ensure there is no uneven wear or distortion of equipment component parts.

.2 The Contractor shall protect painted, polished and machined metal surfaces from corrosion and damage during shipment and storage and shall carefully pack and crate the equipment for shipment. The Contractor shall protect threaded connections with threaded plugs or caps and shall protect open plain end pipes with caps. He shall especially pack electrical equipment and control panels to prevent scratching, access by dirt, moisture or dust or damage to insulation, and shall cover equipment having exposed bearings and glands to exclude foreign matter. All openings in the equipment shall be covered before shipment. Sufficient lifting hooks shall be supplied for handling all crates or boxes and heavy pieces.

.3 The equipment may have to be stored on the site for an extended period of time before installation and equipment performance testing. Accordingly, the Contractor shall provide any special packaging and protective coatings, lubricants, etc. which the Contractor deems necessary to protect the equipment during the protracted storage and prior to equipment performance testing. The Contractor will be responsible for removing any protective coatings prior to installation and equipment performance testing in accordance with the manufacturer's written instructions.

1.8 Installation Assistance

.1 Where stated in the specifications, the Contractor shall provide a Manufacturer's Representative who, in conjunction with the Contract Administrator or his agent, shall give instructions regarding the installation of the equipment.

.2 Before commencing installation of equipment, the Contractor will arrange for the attendance of the Manufacturer's Representative to provide instructions in the methods, techniques, precautions, and any other information relevant to the successful installation of the equipment.

.3 The Contractor will inform the Contract Administrator, in writing, of the attendance at the Site of the Manufacturer's Representative for installation training at least fourteen (14) Calendar Days prior to arrival.

.4 The Contractor shall instruct the Installation Contractor in the proper installation of the equipment and shall provide all necessary installation instructions to the Installation Contractor in writing.

.5 The Contractor shall provide advice and instructions to the Installation Contractor on the installation of the equipment but shall not be responsible for the detailed supervision of the installation of the equipment or of the workers installing it. The Contractor shall notify the Contract Administrator in writing immediately in the event of any disputes with the Installation Contractor concerning installation of the equipment.

.6 The Manufacturer's Representative shall complete **Form 101**, attached to this specification, when satisfied that the Contractor has received adequate instruction in the installation of the Contractor's equipment. The completed **Form 101** must be submitted to the Contract Administrator prior to the commencement of equipment installation. Such certification shall

be provided to the Contract Administrator before the Manufacturer's Representative leaves the Site.

.7 Installation of the equipment will not commence until the Contract Administrator has advised that completed **Form 101** has been accepted.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 Installation

.1 The Contractor will arrange for the Manufacturer's Representative of the fire pump and fire pump controller to visit the site to provide the Contractor with an overview or the installation requirements prior to the installation of the fire pumps and fire controllers.

.2 Prior to completing installation, the Contractor will inform the Contract Administrator and arrange for the attendance at the Site of the Manufacturer's Representative to verify successful installation.

.3 The Manufacturer's Representative shall conduct a detailed inspection of the installation including alignment, attached pipe work, wiring and motor starters, electrical connections, controls and instrumentation, rotation direction, running clearances, lubrication, workmanship, satisfactory noise and vibration requirements and all other items as required to ensure successful operation of the equipment.

.4 The Manufacturer's Representative shall identify any outstanding deficiencies in the installation and shall provide a written report to the Contract Administrator and Contractor describing such deficiencies.

.5 The deficiencies shall be rectified by the Contractor and the Manufacturer's Representative will be required to re-inspect the installation, at no cost to the City.

.6 The Manufacturer's Representative shall complete **Form 102**, attached to this specification, following installation of the equipment. The completed **Form 102** must be submitted to the Contract Administrator prior to the commencement of functional testing.

.7 Deliver the completed **Form 102** to the Contract Administrator prior to departure of the Manufacturer's Representative from the site.

.8 Tag the equipment with a 100 mm by 200 mm card stating "Equipment Checked. Do Not Run." stenciled in large black letters. Sign and date each card.

3.2 Equipment and Performance Verification

.1 Equipment will be subjected to the demonstrations and test indicated in Section 01 79 00 - Demonstration and Section 01 91 13 - General Facility Operational Review.

.2 The Contractor will inform the Contract Administrator at least fourteen (14) days in advance of conducting the tests and arrange for the attendance of the Manufacturer's Representative as specified in various sections. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Contractor and the Contract Administrator.

.3 Where specified, the Manufacturer's Representative shall conduct all necessary checks to the equipment and if necessary, advise the Contractor of any further work needed prior to confirming the equipment is ready to run.

3.3 Summary Requirements

.1 All services required to complete the initial demonstration, running test and equipment performance tests are the responsibility of the Contractor.

.2 Should the initial demonstration, running test or equipment performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, running tests, and/or performance tests will be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Contract Administrator, or the City, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor.

.3 On successful completion of the demonstration, running tests, and performance tests, the **"Certificate of Satisfactory Equipment Performance" (Form 103)** attached to this specification will be signed by the Manufacturer's Representative, the Contractor, the Contract Administrator and the City.

3.4 Supplements

.1 The supplements listed below, following "End of Section", are part of this specification

.1 Form 100: Certificate of Equipment Delivery

.2 Form 101: Certificate of Readiness to Install

.3 Form 102: Certificate of Satisfactory Installation

.4 Form 103: Certificate of Equipment Satisfactory Performance

END OF SECTION

CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100

We certify that the equipment listed below has been delivered into the care of the Installation Contractor. The equipment has been found to be in satisfactory condition and meets its Basic Design Criteria. No defects in the equipment were found.

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

Print Name	Signature	Date
(Authorized Signing Representative of the City)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contractor)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contract Administrator)		

CERTIFICATE OF READINESS TO INSTALL
FORM 101

We have familiarized the installer of the specific installation requirements related to the Product listed below and are satisfied that their understanding the required procedures.

PROJECT: _____

PRODUCT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____ _____
Print Name Signature Date
(Authorized Signing Representative of the Manufacturer)

I certify that I have received satisfactory installation instructions from the Product manufacturer/ supplier.

_____ _____ _____
Print Name Signature Date
(Authorized Signing Representative of the Contractor)

CERTIFICATE OF SATISFACTORY INSTALLATION
FORM 102

We have completed our checks and inspection of the installation of our product as listed below and confirm that it is satisfactory and that defects have been remedied except any as noted below

PROJECT: _____

PRODUCT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

OUTSTANDING DEFECTS: _____

Print Name	Signature	Date
(Authorized Signing Representative of the Manufacturer)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contractor)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contract Administrator)		

Print Name	Signature	Date
(Authorized Signing Representative of the City)		

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE
FORM 103

We certify that the Product listed below has been continuously operated for at least fourteen (14) consecutive days and that the equipment operates satisfactorily and meets its specified operating criteria. No defects in the equipment were found. The equipment is therefore classed as "conforming".

PROJECT: _____

PRODUCT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

Print Name	Signature	Date
(Authorized Signing Representative of the Manufacturer)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contractor)		

Print Name	Signature	Date
(Authorized Signing Representative of the Contract Administrator)		

Print Name	Signature	Date
(Authorized Signing Representative of the City)		

EXAMINATION AND PREPARATION

1. GENERAL

1.1 Qualifications of Surveyor

.1 Qualified Construction Surveyor.

.2 Submit work experience resume for review and approval by the Contract Administrator.

1.2 Survey Reference Points

.1 Existing base horizontal and vertical control points are designated on Drawings.

.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.3 Make no changes or relocations without prior written notice to the Contract Administrator.

.4 Report to the Contract Administrator when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.5 Require surveyor to replace control points in accordance with original survey control.

1.3 Existing Services

.1 Before commencing work, establish location and extent of service lines in area of Work and notify the Contract Administrator of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by the Contract Administrator.

1.4 Location of Equipment and Fixtures

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform the Contract Administrator of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by the Contract Administrator.

1.5 Records

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 Record locations of maintained, re-routed and abandoned service lines.

1.6 Action and Informational Submittals

.1 Submit name and address of surveyor to the Contract Administrator.

.2 On request of the Contract Administrator, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract.

1.7 Subsurface Conditions

.1 Promptly notify Contract Administrator in writing if subsurface conditions at Site differ materially from those indicated in Contract, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Contract Administrator determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

EXECUTION

1. GENERAL

1.1 Action and Informational Submittals

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:

.1 Structural integrity of elements of project.

.2 Integrity of weather-exposed or moisture-resistant elements.

.3 Efficiency, maintenance, or safety of operational elements.

.4 Visual qualities of sight-exposed elements.

.5 Work of City or separate contractor.

.3 Include in request:

.1 Identification of project.

.2 Location and description of affected Work.

.3 Statement on necessity for cutting or alteration.

.4 Description of proposed Work, and products to be used.

.5 Alternatives to cutting and patching.

.6 Effect on Work of City or separate contractor.

.7 Written permission of affected separate contractor.

.8 Date and time work will be executed.

1.2 Materials

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 Preparation

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 Execution

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 - Firestopping, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

CLEANING

1. GENERAL

1.1 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by the City or other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from Authorities Having Jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use marked separate bins for recycling.

.6 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 Final Cleaning

.1 Surfaces of all installed components shall be cleaned of any traces of soiling resulting from the handling, installation, or testing prior to turning over to the City, including but not limited to:

.1 Tanks.

.2 Pumps and ancillary devices.

.3 Piping and supports.

.4 Dispensers.

.5 Concrete surfaces.

.6 Electrical panels and control panels.

1.3 Waste Management and Disposal

.1 The Contractor is responsible for the loading and offloading of waste and recycling at the Site and 598 Plinguet Street.

.2 The City will transport waste and recycling from Site.

.3 Contractor is responsible to meet all transport and disposal regulations at all times.

2. PRODUCTS

2.1 Cleaning Products

.1 Cleaning products used must be controlled with the chemical or discharge of product including soaps for washing not contaminate waters in or around the Aqueduct or source water supply.

.2 Only food grade cleaning solutions and products are to be used.

.3 Prior to the use of any cleaning products submit to the Contract Administrator the SDS and any other applicable supporting information of the proposed products for review by the City.

3. EXECUTION (NOT USED)

END OF SECTION

CLOSEOUT PROCEDURES

1. GENERAL

1.1 Administrative Requirements

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract.

.1 Notify Contract Administrator in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Contract Administrator's inspection.

.2 Contract Administrator's Inspection:

.1 Contract Administrator and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted and balanced and fully operational.

.4 Certificates required by Fire Commissioner, and Utility companies: submitted.

.5 Operation of systems: demonstrated to the City's personnel.

.6 Commissioning of systems completed:

.1 Mechanical.

.2 Electrical.

.3 Controls and Instrumentation.

.7 O&M Manuals and all other support documents provided to satisfaction of the City and the Contract Administrator.

.4 Declaration of Substantial Performance: refer to D15.

1.2 Final Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for recycling and disposal.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

CLOSEOUT SUBMITTALS

1. GENERAL

1.1 Related Requirements

.1 Not Used.

1.2 References

.1 Not Used.

1.3 Administrative Requirements

.1 Pre-warranty Meeting:

.1 Convene meeting one (1) week prior to Substantial Completion with Contractor's Representative and Contract Administrator, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review Manufacturer's installation instructions and warranty requirements.

.2 Contract Administrator to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.4 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Two (2) weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, one (1) draft hard copy of operating and maintenance manuals in English.

.3 Upon review by Contract Administrator, make any required revisions, and provide four (4) final hard copies in heavy duty D ring type binders, and one copy on electronic media (USB flash drive).

.4 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.5 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 Format

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, heavy duty, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dxf and dwg format on CD or DVD.

1.6 Contents - Project Record Documents

.1 Table of Contents for Each Volume: provide title of project:

.1 Date of submission; names.

.2 Addresses and telephone numbers of Contract Administrator and Contractor with name of responsible parties.

.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating Manufacturer's instructions.

.6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.7 As-Built Documents and Samples

.1 Maintain, in addition to requirements in General Conditions, at site for Contract Administrator and the City one (1) record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed Shop Drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store Record Documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label Record Documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Contract Administrator.

1.8 Recording Information on Project Record Documents

.1 Record information on set of black line opaque drawings and in copy of Project Manual, provided by Contract Administrator.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and Shop Drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations/depth of burial and inverts of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related Shop Drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain Manufacturer's certifications, inspection certifications, and field test records, required by individual Specifications Sections.

.7 Provide digital photos, if requested, for site records. Photos will require pre-approval and review by the City for security reasons.

1.9 Equipment and Systems

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include Manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original Manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.12 Provide list of original Manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.13 Include test and balancing reports as specified in Section 01 91 13 - General Facility Operational Review.

.14 Additional requirements: as specified in individual Specification Sections.

1.10 Materials and Finishes

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual Specifications Sections.

1.11 Maintenance Materials

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual Specification Sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site agreed transfer location; place and store once on site.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Contract Administrator.

.2 Include approved listings in Maintenance Manual.

1.12 Delivery, Storage and Handling

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with Manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Contract Administrator.

1.13 Warranties and Bonds

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, thirty (30) calendar days before planned pre-warranty conference, to Contract Administrator approval.

.3 Warranty management plan to include required actions and documents to assure that Contract Administrator receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Contract Administrator for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) working days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with the City's permission, leave date of beginning of time of warranty until time indicated in D23 - Warranty.

.8 Conduct joint 11th month warranty inspections, measured from time of Total Performance.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items and commissioned systems.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating the following.

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at post-construction warranty inspections.

.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Contract Administrator to proceed with action against Contractor.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

DEMONSTRATION AND TRAINING

1. GENERAL

1.1 Administrative Requirements

.1 Demonstrate scheduled operation and maintenance of equipment and systems to the City's personnel two (2) weeks prior to date of final inspection, or as otherwise required by the City.

.2 The City: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Provide two (2) Working Days to demonstrate to the City's personnel, one (1) Working Day for operation personnel and one (1) Working day for maintenance personnel.

.4 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation in accordance with applicable sections.

.4 Ensure testing, adjusting, and balancing has been performed and equipment and systems are fully operational.

.5 Demonstration and Instructions:

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon time.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.2 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two (2) weeks prior to designated dates, for Contract Administrator's approval.

.3 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

.6 Time Allocated for Instructions: ensure amount of time required for instruction of each item of equipment or system as follows:

.1 Electrical Distribution System Upgrades

.2 Fire Pump System Operations

1.3 Quality Assurance

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct the City's personnel.

.2 Provide written report that demonstration and instructions have been completed.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

GENERAL FACILITY OPERATIONAL REVIEW

1. GENERAL

1.1 Summary

.1 Section Includes:

.1 General requirements relating to facility start-up and confirmation that all systems are operating according to design.

.2 Related Requirements

.1 Section 01 61 10 Equipment Installation.

.2 Section 21 05 01 Common Work Results for Mechanical.

.3 Acronyms:

.1 O&M - Operation and Maintenance.

.2 TAB - Testing, Adjusting and Balancing.

1.2 General

.1 The Contractor will demonstrate to the City the suitable operation of the following main systems according to Manufacturer's ratings and recommendations, site performance requirements, and control sequences:

.1 Fire Pumps.

.2 All valves and controls for above.

.3 Electrical distribution.

.2 Contractor will operate equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be operated interactively with each other as intended in accordance with Contract and design criteria.

.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: To meet Project functional and operational requirements.

1.3 Overview

.1 This will ensure the installation is constructed and proven to operate satisfactorily under environmental and occupancy conditions to meet functional and operational requirements. Activities include transfer of training of facility operational personnel.

.2 The City will issue acceptance documentation in accordance with Section 01 61 10 Equipment Installation.

1.4 Non-Conformance to Performance Verification Requirements

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during testing, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the Contract Administrator, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 Contractor Responsibilities

.1 Responsibilities include:

Before Construction:

.1 Review Contract and confirm:

.1 Adequacy of provisions for testing.

.2 Aspects of design and installation pertinent to success of testing.

During Construction:

.3 Co-ordinate provision, location and installation of provisions for testing.

.2 Before Start of Operational Review:

.1 Ensure installation of related components, equipment, sub-systems, is complete.

.2 Fully understand start-up and operating requirements and procedures.

.3 Have all checklists and documentation ready.

.4 Understand completely design criteria and intent and special features.

.5 Submit complete start-up documentation to Contract Administrator.

.6 Ensure systems have been cleaned thoroughly.

.7 Complete TAB procedures on systems, submit TAB reports to Contract Administrator for review and approval.

.8 Ensure "As-Built" system schematics are available.

.3 Inform Contract Administrator in writing of discrepancies and deficiencies on finished works.

1.6 Conflicts

.1 Report conflicts between requirements of this section and other sections to Contract Administrator before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 Action and Informational Submittals

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit no later than fifty (50) Calendar Days after award of Contract:

.1 Draft documentation consisting of key equipment manufacturer's start-up, and Contractors checklists for the equipment including:

.1 Electrical distribution and switchgear.

.2 Pumps and Controls

.2 Request in writing to Contract Administrator for changes to submittals and obtain written approval at least fifty (50) Working Days prior to start of operational review.

.3 Provide additional documentation relating to operational review process required by Contract Administrator.

1.8 Documentation

.1 Manufacturer's start-up and operating checklists.

.2 Contractor supplied or trade supplied start-up checklists.

.3 Contract Administrator supplied Control Sequence Review checklist (included in this Section).

.4 Contract Administrator to review and approve documentation.

.5 Provide completed and approved documentation to Contract Administrator.

1.9 Operational Review Schedule

.1 Provide schedule as part of construction schedule, identifying the key systems listed in this section.

.2 Provide adequate time for operational review activities including:

.1 Approval of reports.

.2 Verification of reported start-up and TAB results.

.3 Repairs, retesting, re-verification.

.4 Training.

1.10 Starting and Testing

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.11 Witnessing of Starting and Testing

.1 Provide fourteen (14) Calendar Days' notice prior to commencement.

.2 Contract Administrator may witness start-up and initial testing.

.3 Contractor to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.12 Manufacturer's Involvement

.1 Integrity of warranties:

.1 Use Manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.

.2 Verify with Manufacturer that testing as specified will not void warranties.

.2 Qualifications of Manufacturer's personnel:

.1 Experienced in design, installation and operation of equipment and systems.

.2 Ability to interpret test results accurately.

.3 To report results in clear, concise, logical manner.

1.13 Procedures

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Operational Review.

.2 Conduct start-up and testing in following distinct phases:

.1 Included in delivery and installation:

.1 Verification of conformity to specification, approved Shop Drawings.

.2 Visual inspection of quality of installation.

.2 Start-up: follow accepted start-up procedures.

.3 Correct deficiencies and obtain approval from Contract Administrator after distinct phases have been completed and before commencing next phase.

.4 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Contract Administrator. If results reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:

.1 Minor equipment/systems: implement corrective measures approved by Contract Administrator.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Contract Administrator.

.3 If evaluation report concludes that major damage has occurred, Contract Administrator shall reject equipment.

.1 Rejected equipment to be removed from site and replaced with new.

.2 Subject new equipment/systems to specified start-up procedures.

1.14 Start-Up Documentation

.1 Assemble start-up documentation and submit to Contract Administrator for approval before commencement of operational review.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists and reports,

.4 Step-by-step description of complete start-up procedures, to permit Contract Administrator to repeat start-up at any time.

1.15 Operation and Maintenance of Equipment and Systems

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit Contract Administrator for approval before implementation.

.3 Operate and maintain systems for length of time required for operational review to be completed.

.4 After completion of review, operate and maintain systems until issuance of certificate of interim acceptance.

1.16 Test Results

.1 If start-up or operational review produces unacceptable results, repair, replace or repeat specified starting procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-operational review.

1.17 Start of Operational review

.1 Notify Contract Administrator at least fourteen (14) Calendar Days prior to start of Operational Review.

.2 Start Operational Review after elements of building affecting start-up and performance verification of systems have been completed.

1.18 Instruments / Equipment

.1 Submit to Contract Administrator for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.2 Provide

.1 Equipment as required to complete work.

1.19 Operational Review

.1 Carry out Operational Review:

.1 Under actual conditions to confirm equipment operating:

.1 As per Manufacturer's ratings and recommendations;

.2 As specified and required by site conditions; and

.3 According to control and operating sequences.

.2 Operational Review procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment Manufacturer's operating instructions.

1.20 Witnessing Operational Review

.1 Contract Administrator to witness activities and verify results.

1.21 Authorities Having Jurisdiction

.1 Where specified start-up, testing or operational review procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to Contract Administrator within five (5) working days of test and with Operational Review report.

1.22 Sundry Checks and Adjustments

.1 Make adjustments and changes which become apparent as Operational Review proceeds.

.2 Perform static and operational checks as applicable and as required.

1.23 Deficiencies, Faults, Defects

.1 Correct deficiencies found during start-up and Operational Review to satisfaction Contract Administrator.

.2 Report problems, faults or defects affecting Operational Review to Contract Administrator in writing. Stop Operational Review until problems are rectified. Proceed with written approval from Contract Administrator.

1.24 Completion of Operational review

.1 Upon completion of Operational Review leave systems in normal operating mode or as requested by Client.

.2 Except for warranty and seasonal verification activities specified in Operational Review specifications, complete Operational Review prior to issuance of Interim Certificate of Completion.

.3 Operational Review to be considered complete when contract Operational Review deliverables have been submitted and accepted by Contract Administrator.

1.25 Activities Upon Completion of Operational Review

.1 When changes are made to baseline components or system settings established during Operational Review process, provide updated Operational Review form for affected item.

1.26 Training

.1 In accordance with Section 01 79 00 - Demonstration and Training.

1.27 Maintenance Materials, Spare Parts, Special Tools

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in Contract.

1.28 Installed Instrumentation

.1 Use instruments installed under Contract for TAB if:

.1 Accuracy complies with these specifications.

.2 Calibration certificates have been deposited with Contract Administrator.

1.29 Review Tolerances

.1 Application tolerances:

.1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.

.2 Instrument accuracy tolerances:

.1 To be of higher order of magnitude than equipment or system being tested.

.3 Measurement tolerances during verification:

.1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.30 City's Performance Testing

.1 Performance testing of equipment or system by the City or its Contract Administrator will not relieve Contractor from compliance with specified start-up and testing procedures.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION – CHECKLISTS FOLLOW

GENERAL FACILITY OPERATIONAL REVIEW

	PHASE 2 FIRE PUMP INSTALLATIONS:	OK Y or N	Comments
.1	Electrical substation works reviewed and accepted by the Authority Having Jurisdiction.		
.2	New electric fire pump and controller Installed		
.3	Water in pump inlet channel.		
.4	All piping installed and leak tested.		
.5	Pump Manufacturer's startup and performance tests performed and successfully completed, and documented.		
.6	Fire Pump Auto Start on signal, when on Grid Power		
.7	Fire Pump Manual Start on Grid Power.		
.8	Pump controller alarms operational and providing general alarm signal for City use.		
.9	Pump flow confirmed with performance requirements.		

GENERAL FACILITY OPERATIONAL REVIEW

	PHASE 3 FIRE PUMP INSTALLATIONS:	OK Y or N	Comments
.1	New electric fire pump and controller Installed		
.2	Water in pump inlet channel.		
.3	All piping installed and leak tested.		
.4	Pump Manufacturer's startup and performance tests performed and successfully completed, and documented.		
.5	Fire Pump Auto Start on signal, when on Grid Power		
.6	Fire Pump Manual Start on Grid Power.		
.7	Pump controller alarms operational and providing general alarm signal for City use.		
.8	Pump flow confirmed with performance requirements.		

FIRESTOPPING

1. GENERAL

1.1 Quality Assurance

.1 Firestopping and smoke sealing shall be by competent installers having minimum five (5) years experience in application of materials and systems being used, approved and trained by material or system manufacturer.

1.2 Submittals

.1 Submit Shop Drawings and samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings to indicate ULC assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, installation methods and materials of firestopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, size of opening, adjacent materials and number of penetrations. Submit copies of current ULC listings for each system and certified copies of test reports verifying that firestopping and smoke seals meet or exceed specified requirements.

1.3 Environmental Requirements

.1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and material safety data sheets acceptable to Ministry of Labour.

2. PRODUCTS

2.1 Materials

.1 Certified and listed by ULC or WH in accordance with CAN4 – S115 and bearing ULC or WH label, products shall be heat resistant, flexible, durable and compatible with adjacent materials and finishes. System shall be self-supporting at penetration capable to adhere and yet maintain its integrity while providing effective barrier against passage of flame, smoke and gases. Product shall provide flame and temperature rating in accordance with requirements of NBC for openings in respective fire resistance rated floor, wall or other assembly.

.2 Asbestos free firestopping and smoke seal materials and/or systems to provide closures to fire and smoke at openings around penetrations, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions. System shall provide draft tight barriers to retard passage of flame and smoke, and firefighter's hose stream and passage of liquids. Provide firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside bus ducts) respectively and around outside of such mechanical and electrical assemblies where they penetrate rated fire separations.

.3 Firestop Systems: Certified by ULC, WH and listed in ULC Guide No. 40 U19.

.4 Firestop System Components: Certified by ULC, WH and listed in ULC Guide No. 40 U19.13 under the Label Service of ULC.

.5 Cementitious Matrices: Minimum 2758 kPa (400 psi) compressive strength when cured, to retard cable tray warping within the firestop seal.

.6 Firestopping and Smoke Seals at Openings Where Reinstallation Occurs: An elastomeric or re-useable cementitious matrix or putty seal; do not use a permanent cementitious seal at such locations.

.1 Firestopping and smoke seals at openings around penetrations for electrical bus ducts, pipes, ductwork and other electrical and mechanical items requiring sound and vibration control or allowance for expansion, contraction and other movement: An elastomeric seal; do not use a cementitious or rigid seal at such locations.

.2 Firestopping and smoke seals at joints and spaces designed and required to allow movement such as building movement joints, deflection spaces, control joints, expansion joints, and similar locations shall be flexible, elastomeric seal suitable to withstand the required movement and capable of returning to original configuration without damage to seal and without adhesive or cohesive failure; do not use a cementitious or rigid seal at such locations.

.3 Primers: To Manufacturer's recommendation for specific material, substrate, and end use.

.4 Water (if applicable): Potable, clean and free from injurious amounts of deleterious substances.

.5 Damming and Back-up Materials, Supports and Anchoring Devices: To Manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.6 Pipe and Duct Insulation and Wrappings: Compatible with firestopping systems.

.7 Intumescent Pads: Permanently pliable type.

.8 Intumescent Composite Sheet: Composite sheet, strip or precut shapes.

.9 Sealants and Putty for Vertical and Overhead Joints: Non-sagging.

.10 Materials and products shall not cause stress, chemical or physical reaction, or other damage to penetrating items or adjacent materials.

3. EXECUTION

3.1 Installation

.1 Ensure materials and products are compatible with abutting materials, coatings and finishes. Remove applied coatings and finishes as required to permit proper installation and adhesion.

.2 Ensure that pipe and duct insulation and wrappings occurring within openings to receive firestopping and smoke seal are installed prior to work of this Section and that insulation and wrapping within fire seals is a ULC listed component of the system to be installed, unless ULC certified assembly permits such other insulation and wrapping to remain within the assembly. Otherwise, precede installation of mechanical insulations or remove insulation

from area of insulated pipe or duct where such pipes or ducts penetrate a fire separation. Ensure the continuity and integrity of thermal and vapour barriers where such are removed, altered, or replaced, acceptable to the Contract Administrator.

.3 Apply firestopping and smoke seals in accordance with Manufacturer's instructions and tested designs acceptable to authorities having jurisdiction to provide required temperature and flame rated seal, and to prevent passage of smoke and liquids.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing. Completely fill and seal voids with firestopping and smoke seal materials. Do not cover up materials until full curing has taken place. Notify when completed installations are ready for inspection and prior to concealing or enclosing firestopping and smoke seals.

3.2 Cleaning

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application. Remove temporary dams after initial set of firestopping and smoke seal materials.

END OF SECTION

COATING SYSTEMS FOR STEEL PIPES AND MISCELLANEOUS METAL FABRICATIONS

1. GENERAL

1.1 References

.1 The following is a list of standards which may be referenced in this Section:

.1 Steel Structures Painting Council (SSPC):

.1 SP 1, Surface Preparation Specification No. 1, Solvent Cleaning.

.2 SP 2, Hand Tool Cleaning.

.3 SP 3, Power Tool Cleaning.

.4 SP 5, White Metal Blast Cleaning.

.5 SP 6, Commercial Blast Cleaning.

.6 SP 7, Brush-Off Blast Cleaning.

.7 SP 8, Pickling.

.8 SP 10, Near-White Blast Cleaning.

.9 SP 11, Power Tool Cleaning to Bare Metal.

.10 SP 12, High Pressure Water Jetting.

.2 National Association of Corrosion Engineers (NACE):

.1 RP0188-99 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

1.2 Definitions

.1 Terms used in this Section:

.1 Coverage: Total minimum dry film thickness in mil, or m^2/L.

.2 MDFT: Minimum Dry Film Thickness, mm.

.3 MDFTPC: Minimum Dry Film Thickness per Coat, mm.

.4 Mil: Thousandth of an inch.

.5 PSDS: Paint System Data Sheet.

.6 SP: Surface preparation.

1.3 Submittals

.1 Action Submittals:

.1 Data Sheets:

.1 For each paint system used, furnish a painting system data sheet, and paint colours available (where applicable) for each product used in the paint system, except for products applied by equipment manufacturers.

.2 Submit required information on a system-by-system basis.

.3 Provide copies of paint system submittals to coating applicator.

.4 Indiscriminate submittal of Manufacturer's literature only is not acceptable.

.2 Detailed chemical and gradation analysis for each proposed abrasive material.

.2 Informational Submittals:

.1 Coating Manufacturer's letter or certificate stating that the proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.

.2 Applicator's Qualification: List of references substantiating experience.

.3 Manufacturer's written instructions for applying each type of coating.

.4 Field Testing: Inspection and test reports.

.5 .

1.4 Quality Assurance

.1 Applicator Qualifications: Minimum five (5) years' experience in application of specified products.

.2 Regulatory Requirements:

.1 Meet federal, provincial, and local requirements limiting the emission of volatile organic compounds.

.2 Perform surface preparation and painting in accordance with recommendations of the following:

.1 Paint Manufacturer's instructions.

.2 SSPC-PA Guide No. 3, Guide to Safety in Paint Applications.

.3 Federal, provincial, and local agencies having jurisdiction.

1.5 Delivery, Storage, and Handling

.1 Deliver materials to Application Site in unopened containers labelled with designated name, date of manufacture, colour, and Manufacturer.

.2 Store paints in a protected area that is heated or cooled as required to maintain temperatures within the range recommended by paint Manufacturer.

.3 Shipping:

.1 Protect pre-coated items from damage. Batten coated items to prevent abrasion.

.2 Use non-metallic or padded slings and straps in handling.

1.6 Environmental Requirements

.1 Do not apply paint in temperatures outside of Manufacturer's recommended maximum or minimum allowable, or in dust, smoke-laden atmosphere, damp or humid weather.

.2 Do not perform abrasive blast cleaning whenever relative humidity exceeds 85%, or whenever surface temperature is less than 3°C above dew point of ambient air.

2. PRODUCTS

2.1 Manufacturers

.1 Manufacturer with a minimum of 10 years' experience in manufacture of specified product.

2.2 Materials

.1 Quality: Manufacturer's highest quality products and suitable for intended use.

.2 Abrasives: As recommended by paint Manufacturer to produce surface profile recommended for specific paint system.

.3 Materials Including Primer and Finish Coats: Produced by same paint Manufacturer.

.4 Thinners, Cleaners, Driers, and Other Additives: As recommended by paint Manufacturer of the particular coating.

2.3 Colours

.1 Formulate with colorants free of lead and lead compounds.

.2 Furnish as selected by Contract Administrator.

.3 Proprietary identification of colours is for identification only; selected manufacturer may supply matches.

2.4 Mixing

.1 Multiple-Component Coatings:

.1 Prepare using all the contents of the container for each component as packaged by paint Manufacturer.

.2 No partial batches will be permitted.

.3 Do not use multiple-component coatings that have been mixed beyond their pot life.

.4 Furnish small quantity kits for touch-up painting and for painting other small areas.

.5 Mix only components specified and furnished by paint Manufacturer.

.6 Do not intermix additional components for reasons of colour or otherwise, even within the same generic type of coating.

.2 Keep paint material containers sealed when not in use.

3. EXECUTION

3.1 General

.1 Coatings and linings on steel piping shall be applied in strict accordance with manufacturer's recommendations and the Tender Documents.

3.2 Preparation

.1 Remove, mask, or otherwise protect hardware, machined surfaces, nameplates on machinery, and other surfaces not intended to be painted.

.2 Protect all surfaces adjacent to, or downwind of Work area from overspray. Contractor shall be responsible for any damage resulting from overspray.

3.3 Preparation of Surfaces

.1 Metal Surfaces:

.1 Meet requirements of the following SSPC Specifications as referenced in specific coating systems:

.1 Solvent Cleaning: SP 1.

.2 Hand Tool Cleaning: SP 2.

.3 Power Tool Cleaning: SP 3.

.4 White Metal Blast Cleaning: SP 5.

.5 Commercial Blast Cleaning: SP6

.6 Brush-Off Blast Cleaning: SP 7.

.2 Wherever the words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, or “blast cleaning”, or similar words of equal intent are used in these Specifications or in paint Manufacturer’s specifications, they shall be understood to refer to the applicable SSPC Specifications listed above.

.3 Hand tool clean areas that cannot be cleaned by power tool cleaning.

.4 Preblast Cleaning Requirements:

.1 Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.

.2 Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.

.3 Clean small isolated areas as above or solvent clean with suitable solvents and clean cloths.

.4 Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.

.5 Welds and Adjacent Areas:

.1 Prepare such that there is:

.1 No undercutting or reverse ridges on weld bead.

.2 No weld spatter on or adjacent to weld or other area to be painted.

.3 No sharp peaks or ridges along weld bead.

.2 Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

.6 Blast Cleaning Requirements:

.1 Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer’s recommendations.

.2 Select type and size of abrasive to produce a surface profile that meets coating Manufacturer’s recommendations for particular primer to be used.

.3 Use only dry blast cleaning methods.

.4 Do not reuse abrasive, except for designed recyclable systems.

.5 Meet applicable federal, provincial, and local air pollution and environmental control regulations for blast cleaning and disposition of spent aggregate and debris.

.7 Post-Blast Cleaning and Other Cleaning Requirements:

.1 Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapour) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.

.2 Paint surfaces the same day they are blast cleaned. Reblast surfaces that have started to rust before they are coated.

3.4 Application

.1 General:

.1 Apply coatings in accordance with paint manufacturer's Recommendations. Allow sufficient time between coats to assure thorough drying of previously applied paint.

.2 Paint units to be bolted or screwed together and to structures prior to assembly or installation.

.3 For two-package or converted coatings, consult coatings Manufacturer for specific procedures as relates to Manufacturer's products.

.4 After welding, or threading, prepare holdback areas as required for specified paint system. Apply in accordance with Manufacturer's instructions.

.2 Film Thickness:

.1 Number of Coats: Minimum required without regard to coating thickness. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in Manufacturers' products, and atmospheric conditions.

.2 Maximum film build per coat shall not exceed coating Manufacturer's recommendations.

.3 Film Thickness Measurements:

.1 Perform with properly calibrated instruments.

.2 Contractor shall provide calibrated DFT gauge for use by Contract Administrator.

.3 Recoat and repair as necessary for compliance with the Specifications.

.4 All coats are subject to inspection by the Contract Administrator.

.4 Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.

.5 Thickness Testing:

.1 After repaired and recoated areas have dried sufficiently, final tests will be conducted by the Contract Administrator.

.2 Measure coating thickness specified in mils with a magnetic type dry film thickness gauge, provided by the Contractor.

.3 Check each coat for correct millage. Do not make measurement before a minimum of eight (8) hours after application of coating.

.3 Damaged Coatings, Pinholes, and Holidays:

.1 Feather edges and repair in accordance with recommendations of paint Manufacturer.

.2 Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with coating in accordance with the specifications.

.4 Unsatisfactory Application:

.1 If item has an improper finish colour, or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified colour and coverage. Obtain specific surface preparation information from coating manufacturer.

.2 Evidence of runs, bridges, shiners, laps, or other imperfections are causes for rejection.

.3 Repair defects in coating systems in accordance with written recommendations of coating manufacturer.

.4 Leave all staging up until the Contract Administrator has inspected surface or coating. Replace staging removed prior to approval by the Contract Administrator.

3.5 Field Quality Control

.1 Testing Gauges:

.1 Provide a magnetic type dry film thickness gauge to test coating thickness specified.

3.6 Cleanup

.1 Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at the end of each day.

.2 Upon completion of the Work, remove staging, scaffolding, and containers from the Site or destroy in a legal manner.

.3 Completely remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.7 Protective Coatings Systems Schedule

.1 Protective coatings shall be applied to the following items and as indicated on the drawings:

.1 All fuel piping

.1 Colour: Yellow – to be confirmed with the Contract Administrator

.2 Ungalvanized structural steel:

.1 Colour: Safety yellow unless otherwise indicated or approved.

.3 Miscellaneous metal fabrications, interior and exterior,

.1 Colour:

.1 Interior drip pans: safety yellow

.2 Interior ramps: safety yellow

.3 Outside pump enclosures: white – painted inside and out.

COATING SYSTEMS FOR STEEL PIPES AND MISCELLANEOUS METAL FABRICATIONS

Surface Prep.	Application	Paint Material	Product	Min. Cover
Shop Applied				
SSPC-SP6 / NACE 3 commercial blast cleaning/, 2-3mil profile. Protect blast profile if specified coating application delayed more than 8 hours, or as per coating manufacturer specifications.	Coat all external surfaces except field welding holdback, prior to assembly. Prepare and apply to holdback after welds.	Low VOC Epoxy. Semi-gloss.	International PC / Devoe Bar Rust 236 or approved equivalent in accordance with B7. and Devoe Devthane 379H gloss polyurethane enamel	6.0 to 8.0 mils MDFT 2.0 to 3.0 mils MDFT
Field Applied to holdback areas, or general touch-up:				
Surface prep SSPC-SP1 solvent clean followed by a combination of SSPC-SP2 (hand tool clean) and SSPC-SP3 (power tool clean) as accessibility allows.		Low VOC Epoxy. Semi-gloss.	Bar Rust as above. Devthane 379 as above.	Bush and roller at 2 – 3 mils DFT. Two coats for a total range of 4 – 6 mils DFT. Devthane 379 applied by brush and roller at 2 mils DFT.

END OF SECTION

1. GENERAL

1.1 Related Requirements

.1 Division 23.

1.2 Action and Informational Submittals

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop drawings; submit drawings.

.3 Shop drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.4 Shop drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Points of operation on performance curves.

.3 Manufacturer to certify current model production.

.5 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.2 Operation and maintenance manual approved by, and final copies deposited with, Contract Administrator before final inspection.

.3 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Operation instruction for systems and component.

.4 Description of actions to be taken in event of equipment failure.

.5 Valves schedule and flow diagram.

.6 Colour coding chart.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.6 Approvals:

.1 Submit one (1) copy of draft Operation and Maintenance Manual to Contract Administrator for approval. Submission of individual data will not be accepted unless directed by Contract Administrator.

.2 Make changes as required and re-submit as directed by Contract Administrator.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.8 Site records:

.1 Contract Administrator will provide one (1) set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.9 As-Built Drawings:

.1 Prior to start of Testing finalize production of As-Built Drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Contract Administrator for approval and make corrections as directed.

.4 Perform testing using As-Built Drawings.

.5 Submit completed reproducible As-Built Drawings with Operating and Maintenance Manuals.

.10 Submit copies of As-Built Drawings for inclusion in final report.

1.3 Quality Assurance

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 Maintenance

.1 Provide spare parts for each different item of equipment and material recommended by the manufacturer to be replaced after one (1) and three (3) years of service.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00 - Closeout Submittals.

2. PRODUCTS

2.1 Materials

.1 Not Used.

3. EXECUTION

3.1 Painting Repairs and Restoration

.1 Do painting in accordance with Section 09 87 00 - Coating Systems for Steel Pipes and Miscellaneous Metals.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 Field Quality Control

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

.1 Hydrostatic Test: Piping shall be hydrostatically tested at 1,550 kPa for a period of 2-hours, or at least 345 kPa in excess of the maximum pressure, when the maximum pressure in the system is in excess of 1,200 kPa in accordance with NFPA 20.

.2 Preliminary Tests: Submit proposed procedures for Preliminary Tests prior to the proposed date and time to begin Preliminary Tests. The Pump and Controller Manufacturer's Representative shall witness the complete operational testing of the fire pump and drivers. The manufacturer's representative representative shall each be an

experienced technician capable of demonstrating operation of all features of respective components including trouble alarms and operating features. Fire pumps, drivers and equipment shall be thoroughly inspected and tested to insure that the system is correct, complete, and ready for operation. Tests shall ensure that pumps are operating at rated capacity, pressure and speed. Tests shall include manual starting and running to ensure proper operation and to detect leakage or other abnormal conditions, flow testing, automatic start testing, testing of automatic settings, sequence of operation check, test of required accessories; test of pump alarms devices and supervisory signals, test of relief valves, and test of automatic power transfer. Pumps shall run without abnormal noise, vibration or heating. If any component or system was found to be defective, inoperative, or not in compliance with the contract requirements during the tests and inspection, the corrections shall be made and the entire preliminary test shall be repeated. Submit Preliminary Tests Reports. All items in the Report shall be signed by the Contract Administrator and the Manufacturer's Representative.

.3 Full Water Flow Test: Acceptance test shall include a full water flow test. The securing of all hoses and nozzles during the tests is the responsibility of the Contractor. Water flow testing shall be conducted in a safe manner with no destruction to the existing facility or new construction. Tests shall include 100 and 150 percent capacity flows and pressures, and no-flow pressures for compliance with manufacturer's characteristic curves. At this inspection repeat the required tests as directed.

.4 Correcting Defects: Correct defects in the Work and make additional tests until the Contactor has demonstrated that the system complies with the Contract requirements.

.5 Documentation of Test: Manufacturer’s certified shop test characteristic curves for each pump being tested must be furnished by the Contractor at the time of the pump acceptance test.

.6 Test Equipment: The Contractor shall provide all equipment and instruments necessary to conduct tests.

.2 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.2 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.3 Demonstration and Training

3.4 Conduct demonstration and training in accordance with Section 01 79 00 Demonstration and Training.Protection

.1 Protect new and existing equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

.2 Carefully remove materials so as not to damage remaining materials. Replace existing work damaged by the Contractor’s operations with new Work of the same construction.

END OF SECTION

PIPE WELDING

1. GENERAL

1.1 Related Requirements

.1 Division 1 – General Requirements.

.2 Section 23 11 27 – Piping and Fittings.

1.2 References

.1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.3-2010, Process Piping.

.2 ANSI/ASME Boiler and Pressure Vessel Code-2010:

.1 BPVC 2010 Section I: Power Boilers.

.2 BPVC 2010 Section V: Non-destructive Examination.

.3 BPVC 2010 Section IX: Welding and Brazing Qualifications.

.2 American Welding Society (AWS)

.1 AWS C1.1M/C1.1-2000(R2006), Recommended Practices for Resistance Welding.

.2 AWS Z49.1-2005, Safety in Welding, Cutting and Allied Process.

.3 AWS W1-2000, Welding Inspection Handbook.

.3 Canadian Standards Association (CSA International)

.1 CSA W47.2-M1987(R2008), Certification of Companies for Fusion Welding of Aluminum.

.2 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.3 CSA B51-09, Boiler, Pressure Vessel and Pressure Piping Code.

.4 CSA-W117.2-2006, Safety in Welding, Cutting and Allied Processes.

.5 CSA W178.1-2008, Certification of Welding Inspection Organizations.

.6 CSA W178.2-2008, Certification of Welding Inspectors.

.7 CAN/CGSB 48.9712-2014 Non-destructive Testing - Qualification and certification of NDT personnel (ISO 9712:2012, IDT)

.4 National Research Council/Institute for Research in Construction.

.1 NRCC 53303, National Fire Code of Canada (NFC)-2010.

1.3 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Quality Assurance

.1 Qualifications:

.1 Welders:

.1 Welding qualifications in accordance with CSA B51.

.2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.

.3 Submit welder's qualifications to Contract Administrator.

.4 Each welder to possess identification symbol issued by authority having jurisdiction.

.5 Certification of companies for fusion welding of aluminum in accordance with CSA W47.2.

.2 Inspectors:

.1 Inspectors qualified to

.1 CSA W178.2.

.2 CAN/CGSB 48.9712-2014.

.2 Security clearances for site access as per Part F of the Bid Opportunity.

.3 Certifications:

.1 Registration of welding procedures in accordance with CSA B51.

.2 Copy of welding procedures available for inspection.

.3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

1.5 Delivery, Storage and Handling

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse all of pallets, crates, padding and packaging materials.

2. PRODUCTS

2.1 Electrodes

.1 Electrodes: in accordance with CSA W48 Series.

3. EXECUTION

3.1 Application

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Quality of Work

.1 Welding: in accordance with ANSI/ASME B31.3, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1, applicable requirements of territorial authority having jurisdiction.

3.3 Installation Requirements

.1 Identify each weld with welder's identification symbol.

.2 Backing rings:

.1 Where used, fit to minimize gaps between ring and pipe bore.

.2 Do not install at orifice flanges.

.3 Fittings:

.1 NPS 2 and smaller: install welding type sockets.

.2 Branch connections: install welding tees or forged branch outlet fittings.

3.4 Inspection and Tests - General Requirements

.1 Review weld quality requirements and defect limits of applicable codes and standards with City Representative before work is started.

.2 Formulate "Inspection and Test Plan" in co-operation with Contract Administrator.

.3 Do not conceal welds until they have been inspected, tested and approved by inspector.

.4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

3.5 Specialist Examinations and Tests

.1 General: Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 and approved by Contract Administrator.

.2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.

.3 Inspect and test 100% of welds in accordance with "Inspection and Test Plan" by non-destructive visual examination and 10% by non-destructive magnetic particle (hereinafter referred to as "particle") tests.

.1 Visual examinations: include entire circumference of weld externally and wherever possible internally.

.2 Failure of visual examinations:

.1 Upon failure of welds by visual examination, perform additional testing as directed by Contract Administrator of total of up to 10% of welds, selected at random by Contract Administrator.

3.6 Defects Causing Rejection

.1 As described in ANSI/ASME B31.3 and ANSI/ASME Boiler and Pressure Vessels Code.

3.7 Repair of Welds Which Failed Tests

.1 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.

3.8 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

1. GENERAL

1.1 Reference Standards

.1 ANSI/ASME B31.3-2010, “Process Piping”.

.2 ANSI/MSS-SP-58-1988, “Pipe Hangers and Supports – Materials, Design and Manufacture”.

.3 CAN/CSA B51-09, “Boiler, Pressure Vessel, and Pressure Piping Code”.

1.2 Action and Informational Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit drawings stamped and signed by Professional Engineer registered or licensed in Manitoba for any custom fabricated assemblies.

.3 Submittals to include:

.1 Pipe Hangers.

.2 Rods.

.3 U-bolts.

.4 Building Attachments.

.5 Accessories.

.4 Indicate for each item as applicable:

.1 Manufacturer, model number, safe loads, pressure and temperature rating.

.2 Nominal size and dimensions including details of construction and assembly.

1.3 Closeout Submittals

.1 Submit maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.

1.4 Delivery, Storage, and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

1.5 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

2. PRODUCTS

2.1 Design

.1 Some pipe supports may not be shown on Drawings.

.2 Design supports to support piping shown on Drawings.

.3 Pipe supports shall not become disengaged by movements of supported pipe or vibration of the support beams or building.

.4 Design supports of strength and rigidity to suit normal operating pipe loading, but also for seismic and shipping loads without unduly stressing structure.

.5 Space supports for service and in accordance with the manufacturer’s recommended maximum loading.

.6 All supports shall have a safety factor of 5 to 1.

.7 Fabricate supports and sway braces in accordance with ANSI B31.3 and MSS-SP-58.

2.2 Nuts and Bolts

.1 U.S. standard size blots with hexagon heads and hexagon nuts.

.2 All exterior bolts, nuts and washers shall be hot dip galvanized steel or stainless steel.

.3 ASTM A307 Gr. B carbon steel bolts – hot dip galvanized for exterior use.

.4 ASTM A563 Gr. A heavy hexagonal nuts – hot dip galvanized for exterior use.

.5 Hot dip galvanized bolts and nuts in accordance with ASTM A153.

.6 Project bolt end at least 3 mm beyond nut face, but not more than one bolt diameter.

.7 U-bolts, washers and miscellaneous iron and steel parts used in pipe hangers and supports shall be hot dip galvanized unless otherwise noted.

.8 All buried or submerged bolts, nuts and washers shall be stainless steel.

2.3 Pipe Supports

.1 Supports shall conform to MSS-SP-58.

.2 Finishes:

.1 Pipe supports and hardware: hot dip galvanized unless otherwise noted.

.3 Proprietary Channel Supports and Pipe Clamps

.1 Galvanized steel finish with a minimum of 1.9mm material thickness conforming to ASTM-A653/A653M, "Standard specification for steel sheet, zinc-coated (galvanized) or zinc-iron alloy-coated (galvanealed) by the hot dip process".

.2 Coating designation to be Z275 (G90) indicating 0.27 kg/sq.m. (0.90 oz./sq.ft.) total zinc deposition on both sides by triple spot test.

.3 Channel shall be cold formed into a standardized profile from pre-galvanized material. Composite channel profiles that involve a combination of two channel profiles are to be spot welded at 76mm centers maximum.

.4 Profile numbers shown on drawings are based on Unistrut manufacturer data, and are to be confirmed by calculations for any other manufacturer.

.5 Brackets and fasteners shall be provided as recommended by the manufacturer.

.6 Cushion clamps are to be carbon steel straps and threaded fasteners, yellow trivalent plated finish, with vibration-absorbing plastic insert formed to steel pipe-sized nominal outside diameter. Straps are to be formed to lock into the channels of the proprietary channel supports and to be held together by a single integral threaded fastener with removable nut. Product shall be UL classified to UL2043 and be resistant to diesel fuel. Size to suit pipe outside diameter, refer to drawings for model numbers.

.1 Acceptable material: Hydra-Zorb cushion clamp assemblies, nominal pipe series.

.4 Shop and field-fabricated assemblies.

.1 Steel brackets: MSS SP-89.

.5 Pipe attachments: material to MSS SP-58.

.1 Attachments for steel piping: carbon steel galvanized.

.6 U-bolts: carbon steel to MSS SP-69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: galvanized.

.7 All material to be hot dipped galvanized after metal fabrication unless otherwise noted.

2.4 Riser Clamps

.1 Steel pipe: carbon steel, galvanized.

3. EXECUTION

3.1 Workmanship

.1 Supports are to secure all equipment in place, prevent vibration, maintain uniform slope and provide for expansion and contraction.

.2 Locate supports adjacent to equipment to prevent undue stresses in piping and equipment.

.3 Review all drawings prior to drilling for inserts and supports for piping systems.

.4 Obtain Contract Administrator's approval prior to using percussion type fastenings.

.5 Use of piping or equipment for hanger supports or piercing of ductwork is not permitted.

.6 Install all supports, anchors and seals in accordance with the manufacturer's recommendations.

3.2 Pipe Supports

.1 Spacing of hangers and supports on straight runs shall not exceed the following span

Pipe Size (mm)	Rod Diameter	Maximum Spacing Steel
Up to 32 dia.	10 mm	2.0 m
38 dia.	10 mm	2.75 m
50 dia.	10 mm	3.0 m
63 dia.	13 mm	3.4 m
75 dia.	13 mm	3.7 m
100 dia.	16 mm	4.25 m
150 dia.	19 mm	6.1 m

.2 Place support within 300 mm of each horizontal elbow.

.3 Use supports which are vertically adjustable 40 mm minimum after piping is erected.

.4 Where practical, support riser piping independently of connected horizontal piping.

3.3 Support Installation

.1 Provide shim plates as required to locate the support in the corrected position or elevation for the ambient temperature at the time of installation, and to provide support adjustment range of 20 mm in either direction.

3.4 Painting

.1 Any painting shall be in accordance with Division 9, Section 09 87 00 – Coating Systems for Steel Pipes and Miscellaneous Metal Fabrications.

.2 Supports, anchors and seals inaccessible after installation shall be painted prior to installation.

END OF SECTION

MECHANICAL IDENTIFICATION

1. GENERAL

1.1 Summary

.1 Section Includes:

.1 Materials and requirements for the identification of piping systems, valves and controllers, including the installation and location of identification systems.

.2 Sustainable requirements for construction and verification.

.2 Related Requirements

.1 Division 1 – General Requirements.

1.2 References

.1 City of Winnipeg

.1 Water and Waste Department Identification Standards.

.2 National Research Council/Institute for Research in Construction

.1 Manitoba / National Fire Code of Canada (NFC)-2010.

1.3 Action and Informational Submittals

.1 Product Data:

.2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Quality Assurance

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

1.5 Delivery, Storage, and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling.

.2 Dispose of unused paint material at official hazardous material collections site approved by the City.

.3 Do not dispose of unused paint or coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

2. PRODUCTS

2.1 Manufacturer's Equipment Nameplates

.1 Metal nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 System Nameplates

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm thick white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core, characters filled with black paint.

.3 Sizes:

.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: use size # 5.

.2 Equipment in Pumphouse: use size # 9.

2.3 Existing Identification Systems

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from City Representative.

2.4 Valves, Controllers

.1 Brass tags with 12 mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.5 Controls Components Identification

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

2.6 Language

.1 Identification in English.

3. EXECUTION

3.1 Manufacturer's Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 Timing

.1 Provide identification only after painting has been completed.

3.3 Installation

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and or CSA registration plates as required by respective agency.

3.4 Nameplates

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.5 Valves, Controllers

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one plastic laminated copy of flow diagrams, valve schedules where directed by the City. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

3.6 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PERFORMANCE VERIFICATION MECHANICAL PIPING SYSTEMS

1. GENERAL

1.1 Related Requirements

.1 Division 1 – General Requirements.

.2 Section 23 11 27 – Piping and Fittings.

1.2 References

.1 National Fire Protection Association (NFPA)

.1 NPFA 20 Standard for the Installation of Stationary Fire Pumps for Fire Protection

.2 National Research Council/Institute for Research in Construction.

.1 NRCC 53303, National Fire Code of Canada (NFC)-2010.

1.3 Cleaning and Start-Up of Mechanical Piping Systems

.1 In accordance with NFPA 20

1.4 Reports

.1 In accordance with NFPA 20.

1.5 Training

.1 In accordance with Section 01 79 00 Demonstration and Training.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

ABOVEGROUND FUEL SYSTEM DECOMMISSIONING

1. GENERAL

1.1 Scope

.1 The following statement generally describes the scope of work to be performed by licenced petroleum technician(s) covered by this Section:

.1 Decommissioning of:

.1 Day Tanks, and related devices.

.2 Piping Systems.

.2 Loading at site, offloading and disposal at an approved location.

.3 All permits, inspections, and documentations.

1.2 Related Requirements

.1 Division 1 – General Requirements.

1.3 References

.1 CCME PN 1326, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

.2 Manitoba Regulation 188/2001 – the Dangerous Goods Handling and Transportation Act.

.3 Manitoba Guideline for the Dismantling and Removal of Petroleum Storage Tanks – February 2007.

.4 Canadian Environmental Protection Act.

.5 National Fire Code of Canada 2010, as amended by the Manitoba Fire Code.

.6 Dangerous Goods Handling and Transportation Act – Storage and Handling of Petroleum Products and Allied Products Regulation.

.7 WHMIS Workplace Hazardous Material Information System.

1.4 Submittals

.1 Proposed decommissioning plan shall be provided to the Contract Administration at least 21 calendar days prior to scheduled start of decommissioning. Include:

.1 General description of activities.

.2 Spill containment and mitigation plan.

.3 Disposal method and location.

.4 List of all Authorities Having Jurisdiction and contacts.

.5 Sample permits and documents to be completed.

1.5 Waste Management and Disposal

.1 Remove from site and dispose of all materials at appropriate registered facilities.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

2. PRODUCTS (NOT USED)

3. EXECUTION

3.1 Works by licensed and certified petroleum technicians.

3.2 Demolition:

.1 Upon receiving Substantial Performance for the new installation, and in accordance with the approved schedule of work.

.2 Transfer of remaining fuel to existing storage tanks as follows:

.1 Transfer fuel through strainer and filtration system. Use of new unloading system is permitted if suitable for this operation.

.2 Bottom contents, approximately 5%, of existing fuel, in any tank is to be stored in separate containers provided by the Contractor, for disposal of by the Contractor in an approved method.

.3 Disconnect and remove existing fuel oil piping and pump systems, power, and controls, as indicated on the Drawings.

.4 Turnover items identified by the Contract Administrator to the City.

.5 Prepare tanks and all surplus system components for shipping, load and secure onto GWWD rail car(s). Shipment from site to the location indicated in the supplemental conditions will be by the City.

.6 Receive and unload items at the termination point upon arrival.

.7 Transport and provide final disposal of all tanks and system components.

.8 Complete all regulatory documentation.

.9 Provide certification of disposal to Contract Administrator.

END OF SECTION

1. GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 CSA C22.1-15, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations

.2 CSA-C22.3 No. 1-15, Overhead Systems.

.3 CSA C22.3 No.7-15, Underground Systems.

.4 CSA CAN3-C235-83 (R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics Engineers (IEEE)

.1 IEEE SP1122 (2007), The Authoritative Dictionary of IEEE Standards Terms.

.3 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250-2014, Enclosures for Electrical Equipment (1000 Volts Maximum).

.4 City of Winnipeg

.1 Identification Standard-510276-0000-40ER-0002

.2 Tag Naming Standard-612620-0014-40ER-0001

1.2 Definitions

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these Specifications, and on Drawings, are those defined by IEEE SP1122.

1.3 Design Requirements

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

1.4 Submittals

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 In accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of Drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Contract Administrator of these changes before they are made.

.6 Contract Administrator will not assume the responsibility for searching out deviations in the Contractor's drawings.

.3 Quality Control:

.1 Provide CSA certified equipment and material. Where CSA certified equipment and material is not available, submit such equipment and material inspection authorities for special acceptance approval before delivery to Site.

.2 Submit test results of installed electrical systems and instrumentation.

.3 Permits and fees: in accordance with General Conditions of Contract.

.4 Submit, upon completion of Work, load balance report as described in Part 3.11.1 - Load Balance

.5 Submit certificate of acceptance from Authority Having Jurisdiction upon completion of Work to Contract Administrator.

.4 Manufacturer's Field Reports: submit to Contract Administrator Manufacturer's written report, within three (3) days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in Part 3.11 Field Quality Control.

1.5 Quality Assurance

.1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid license in accordance with Authorities Having Jurisdiction.

1.6 System Start-up

.1 Instruct Contract Administrator and operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of Manufacturer's factory service Contract Administrator to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Arrange and pay for services of an instrumentation technician to check, adjust, balance and calibrate components and instruct operating personnel.

.4 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.7 Operating Instructions

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions as per 01 78 00 – Closeout Submittals to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by Manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

2. PRODUCTS

2.1 Materials and Equipment

.1 Material and equipment to be CSA Certified. Where CSA Certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in 01 33 00 - Submittals.

.2 Factory assemble control panels and component assemblies.

2.2 Electric Motors, Equipment and Controls

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 05 21 - Wire and Cables (0-1000V).

2.3 Warning Signs

.1 Warning Signs: in accordance with requirements of Authority Having Jurisdiction, inspection authorities, and Contract Administrator.

.2 Lamacoid, red with white lettering, minimum size 175 x 250 mm.

2.4 Wiring Terminations

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 Equipment Identification

.1 All equipment identification must follow the City of Winnipeg Water and Waste Identification Standard- 510276-0000-40ER-0002.

2.6 Wiring Identification

.1 Identify conductors and cables in accordance with Identification Standard – 510276-0000-40ER-0002.

2.7 Cable Name/Number Identification

.1 Identify cables at all pull boxes, junction boxes, and outlet boxes for all systems.

.2 Identify each conductor as to panel and circuit, terminal, terminal numbers, system number scheme, and polarization, as applicable.

2.8 Finishes

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two (2) coats of finish enamel.

.1 Paint outdoor ad idoor electrical equipment light gray finish.

2.9 Electrical Single Line Diagrams

.1 Provide electrical single line diagrams under plexiglass as follows:

.1 Electrical distribution system: locate in main electrical room

.2 Drawings: 11 X 17 size.

3. EXECUTION

3.1 Installation

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 except where specified otherwise.

3.2 Grounding

.1 All circuits shall be installed with dedicated green insulated ground wire.

3.3 Dedicated Neutrals

.1 Each circuit shall have its own dedicated neutral wire. Shared neutral for more than 1 circuit shall not be permitted.

3.4 Area Category and Classifications

.1 The Pumping Station building areas have the following electrical categories and classifications as defined in the CEC:

.1	Electrical Room:	General
.2	Gatehouse:	Category 1

3.5 Enclosures

.1	Dry/General	NEMA 250-2014, Type 1
.2	Wet/Outdoor/Corrosive	NEMA 250-2014, Type 4X
.3	Hazardous	NEMA 250-2014, Rated for hazardous location

3.6 Nameplates and Labels

.1 Ensure Manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.7 Conduit and Cable Installation

.1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

.3 Do not mix wiring and/or cables from different panels within the same conduit runs or pull boxes. Provide equipment barriers where acceptable and where applicable.

.4 .

3.8 Separation of Services

.1 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosion.

.2 In particular, contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.

.3 Do not support wiring from pipes, ductwork, etc.

3.9 Sleeves

.1 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.

.2 For wall, partitions and ceilings the ends shall be flush with the finish on both sides but for floors they shall extend 4" above finished floor level.

.3 The space between the sleeve and the conduit shall be filled with foam for fire stop and caulked around the top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound and ensure that the seal is compatible with the floor and ceiling finishes.

3.10 Coordination of Protective Devices

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.11 Field Quality Control

.1 Load Balance

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Provide upon completion of work, load balance report as directed in 01 33 00 - Submittals: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests:

.1 Power generation and distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.4 Systems: fire alarm system.

.5 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of the Contract Administrator.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from Manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in 01 33 00 - Submittals.

.2 Provide Manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with Manufacturer's instructions.

.3 Schedule site visits, to review Work.

END OF SECTION

SCOPE OF ELECTRICAL WORK

1. GENERAL

.1 Supply and install all material, equipment, wiring, and labour necessary for the installation of the systems detailed on the Drawings in accordance with the latest edition of the Manitoba Electrical Code.

1.2 Work Included

.1 General Requirements

.1 General clean-up.

.2 All inspections and obtaining all permits, licenses required by various Inspection Agencies and local regulations related to Electrical Trade.

.3 Scaffolding.

.4 All necessary tools, equipment, and supplies.

.5 Shop Drawings.

.6 Project Record Documents (As-constructed Drawings).

.7 Operating and Maintenance Data, where specified.

.2 Specific Requirements Included but not Limited to Scope of Work

.1 Electrical equipment in the new Electrical Fire Pumps installation, including site underground and above ground services and cabling.

.3 Additional Requirements

.1 Provision of all necessary testing, detailed wiring continuity checks, wiring completion checks, installation integrity checks, functional equipment operation checks and written system verification reports to provide a complete system that is ready for commissioning and start-up.

.2 Provision of commissioning and start-up of all systems included in the Scope of Work as per Section.

.3 Electrical Fire Pumps Installation

.1 Supply and install electrical equipment as described and as shown on Drawing No. 1-0600A-E0006-001. All Work within existing switchgear will be completed by others through Cash Allowances.

.2 Install and terminate cables; Provide electrical connections and connect to all equipment including equipment supplied by other divisions.

.4 General

.1 Provide all cabling required making a complete and operational facility. Provide raceway systems to allow complete installation for all cables. Routing of cable shown on Drawing No. 1-0600A-E0007-001.

.2 Provide complete grounding as herein specified and indicated on the Drawings. All grounding shall comply with the Canadian Electrical Code and local amendments to this code.

.3 All devices mounted in wet areas, Category 1 areas or outdoors shall be Nema 4X rated.

1.3 Materials

.1 Bus systems including all forms of buses integral with the electrical power system, together with their associated insulation, supports, bus ducts and protective devices.

.2 Conductors, including all types of wires, conductors, cables, which form an integral part of the electrical power system.

.3 Cables and bus support systems which are intended to enclose or support all forms of electrical conductors used for any purpose covered by this scope. This includes cable trays, raceways and all forms of rigid, flexible, metallic and non-metallic conduit, and including conduit for communication systems or others, which may be installed at a later date, or buried conduit for wiring work by others, only when such buried conduit is indicated in the Contract .

.4 Control panels associated with any electrical equipment covered under this Section of Work unless otherwise noted.

.5 Circuit breakers of all types and for all applications associated with electrical equipment, which receives its power supply from the main, auxiliary or emergency (including battery) system.

.6 Grounding systems, as required by the Canadian Electrical Code, or as otherwise specified in the Contract.

.7 Control and instrumentation systems - electrical or electronic instrumentation systems, with auxiliary equipment and components, unless specified otherwise.

.8 Transformers of various types, dry, encapsulated etc., and for all applications, except control transformers supplied with Mechanical Equipment included in Division 23.

.9 Electronic data processing and transmission systems, including auxiliary equipment, interface and components.

1.4 Units of Measure

.1 The following three (3) conversion methods were used in product and location dimensions:

.1 Hard Conversion: industry available products which are manufactured in metric measurements.

.2 Soft Conversion: products which are still manufactured in Imperial units and are converted in Specifications using arithmetic conversion factors.

.3 Rationalized Conversion: dimensions which are soft converted and rounded off for ease of measurements.

.2 In cases where measurements may be open for interpretation, dual dimensions have been incorporated until hard conversions can be used exclusively.

1.5 Definitions

.1 All terminologies, abbreviations, and acronyms used in this Document are as listed in the various Standards, Codes, Rules, and Bulletins used herein.

.2 Where the word *install* is used, unless specifically specified, is also meant to include the supply of the equipment.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

WIRE AND BOX CONNECTORS 0-1000 V

1. GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No.18.3-12, Conduit, Tubing, and Cable Fittings, and Update No. 1 (2014).

.2 CSA C22.2 No.18.4-15, Hardware for the Support of Conduit, Tubing, and Cable.

.3 CSA C22.2 No.18.5-13, Positioning Devices.

.4 CSA C22.2 No.65-13, Wire Connectors, and Update No. 1 (2013).

2. PRODUCTS

2.1 Materials

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Clamps or connectors for armoured cable, aluminum sheathed cable, mineral insulated cable, flexible conduit, non-metallic sheathed cable as required to: CSA-C22.2 No.18.3, 18.4 and 18.5.

3. EXECUTION

3.1 Installation

.1 Remove insulation carefully from ends of conductors and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by Manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

.2 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

1. GENERAL

1.1 References, Codes, and Standards

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 0.3-09 (R2014), Test Methods for Electrical Wires and Cables, and Update No. 1 (2010).

.2 CSA-C22.2 No. 131-14, Type TECK 90 Cable, and Update No. 1 (2016).

1.2 Product Data

.1 Submit product data in accordance with Section 26 05 00.

2. PRODUCTS

2.1 Building Wires

.1 Conductors: stranded for #10 AWG and larger, minimum power conductor size #12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene (XLPE) material rated RW90.

2.2 1 kV Teck90 Cable

.1 Conductors:

.1 Grounding conductor: copper

.2 Circuit conductors: copper, minimum size #12 AWG or as indicated.

.2 Armour: interlocking aluminum.

.3 Fastenings:

.1 One-hole malleable iron straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two (2) or more cables at 1,500 mm centers.

.3 Six (6) mm diameter threaded rods to support suspended channels.

.4 Connectors:

.1 Watertight, approved for TECK cable.

2.3 Control Cables

.1 Single conductor wire to be 98% conductivity copper type TEW or TBS insulation rated at 600 V, solid or stranded conductor as required, size as noted on Drawings and specified herein, minimum #14 AWG with 90°C

.2 Cable for power and control shall be based on Teck 90 armoured cable, with stranded copper conductors, 90°C insulation, rated at 600 VAC, integral copper ground wire, PVC inner jacket, aluminum interlocking armour, and PVC outer jacket having heat, flame, and moisture retardant properties. Flame retardancy of outer jacket to be rated in accordance with CSA C22.2, No. 0.3. Conductor size shall be minimum #14 AWG or as noted on the Drawings.

.3 Analog instrumentation cable shall use single or multiple pair, seven (7) strand copper conductor, individually twisted and shielded, individual tinned copper drain wire, complete electrical isolation between shields, overall multi-conductor cable shield with drain wire, XLPE inner jacket, interlocking aluminum armour, and FT4 flame retardant rated outer PVC jacket. Cable shall be provided with a black, white, colour code and number code for each pair. Cable and conductor insulation to be rated for 105°C (dry) and 600 V. Conductor size shall be minimum #18 AWG or as noted on the Drawings.

2.4 300 V Instrument Cable – Armoured

.1 Conductors: 16 AWG, 7 strand concentric lay, Class B tinned copper, twisted pairs/triads.

.2 Insulation: PVC TW75, 75 °C Wet, 105 °C Dry (-40 °C), 300 Volt.

.3 Twisted pairs/triads cabled with staggered lays.

.4 Shielding: Individual twisted pair(s)/triads Aluminum/mylar shield with ST drain wire, 100 % shield. Overall aluminum/mylar shield with ST drain wire. Individual drain wires one size smaller than conductor AWG. Overall drain wire the same AWG as conductors.

.5 Armour: interlocking aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride material (90 °C, -40 °C).

.7 Fastenings:

.1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 300 mm centers.

.8 Connectors:

.1 Watertight, explosion proof approved for armoured cable.

3. EXECUTION

3.1 General

.1 Install and rate power cables in accordance with the Canadian Electrical Code requirements.

.2 Minimum power conductor including luminaire drops to be #12 AWG.

.3 Minimum conductor size #14 AWG for all discrete control cables.

.4 Minimum conductor size #18 AWG for twisted pair analog signal cables.

3.2 Installation of Building Wires

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 25.

.2 In wire ways and auxiliary gutters.

3.3 Installation of Teck Cable 0 - 1000 V

.1 Install cables.

.2 Group cables wherever possible on channels.

.3 Terminate cables in accordance with Section 26 05 20.

3.4 Installation of Control Cables

.1 Install control cables in conduit or cable troughs.

.2 Ground control cable shield at one end only. Shields to be continuous over entire run.

3.5 Workmanship

.1 Before pulling wire, ensure conduit is dry and clean. If moisture is present, thoroughly dry out conduits; vacuum if necessary. To facilitate pulling, recognized specially manufactured wire pulling lubricants may be used. Do not use grease. Employ suitable techniques to prevent damage to wire when ambient temperature is below the minimum permitted for each insulation type. Do not pull wires into incomplete conduit runs.

.2 Installation to be free of opens and grounds. Before energization, measure insulation resistance and comply with the Manitoba Electrical Code. Submit data sheet with values measured.

.3 Do not install any power conductor smaller than #12 AWG, except where specifically indicated otherwise, i.e., for fire alarm system station circuits, P.A. wiring, etc.

.4 Provide conductors as shown on Drawings and cable schedule. Minimum conductor sizes are indicated. Voltage drop from lighting panels to farthest outlet must not exceed 2% at full load in any case. Advise Contract Administrator if problem is foreseen.

.5 Exercise care in stripping insulation from wire. Do not nick conductors.

3.6 Identification, Coding and Balancing

.1 For branch circuit wiring, follow identification system shown on the Drawings and as specified in Section 26 05 00.

.2 Connect single phase equipment to minimize imbalance on feeders. Adjust branch circuiting shown as required for optimum balancing. Record all changes on As-Constructed Drawings.

.3 Colour code all feeders at all terminations, at all points where taps are made, and at all panelboards, switchboards, motor control centres, etc. Use two wraps of 3M #471 plastic film tape 48 mm wide.

.4 Conductors sized No. 10 and smaller are required to be factory coloured or numbered, not taped on Site.

.5 For direct current wiring use red for positive and black for negative.

3.7 Testing

.1 All power and control wiring shall be tested for insulation resistance value with a megger. Resistance values shall be as recommended by the cable manufacturer.

.2 All wire test results shall be properly tabulated, signed, dated, and submitted to the Contract Administrator.

END OF SECTION

CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS

1. GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 18.1-13 Metallic Outlet Boxes.

.2 CSA C22.2 No. 18.2-06 (R2011) Non-metallic Outlet Boxes.

.3 CSA C22.2 No. 18.3-12 Conduit, Tubing, and Cable Fittings.

.4 CSA C22.2 No. 18.4-15 Hardware for the Support of Conduit, Tubing, and Cable.

.5 CSA C22.2 No. 18.5-13 Positioning Devices.

.6 CSA C22.2 No. 45.1-07 (R2012) Electrical Rigid Metal Conduit – Steel.

.7 CSA C22.2 No. 45.2-08 (R2013) Electrical Rigid Metal Conduit — Aluminum, Red Brass, and Stainless Steel.

.8 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.9 CSA C22.2 No. 83-M1985 (R2013), Electrical Metallic Tubing.

.10 CSA C22.2 No. 227.3-15, Mechanical Protection Tubing (MPT) and fittings.

.11 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

2. PRODUCTS

2.1 Conduits

.1 Rigid metal conduit: to CSA C22.2 No. 45.2, aluminum threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45.1, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Flexible metal conduit: to CSA C22.2 No. 56, aluminum liquid-tight flexible metal.

2.2 Conduit Fastenings

.1 One hole stainless steel straps to secure surface conduits 50 mm and smaller.

.1 Two hole stainless steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1 m on centre.

.4 Threaded stainless steel rods, 9 mm diameter, to support suspended channels.

2.3 Conduit Fittings

.1 Fittings: to CSA C22.2 No. 18.3, No. 18.4, and No. 18.5, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

2.4 Fish Cord

.1 Polypropylene.

3. EXECUTION

3.1 Installation

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use rigid aluminum threaded conduit in Ordinary and Category 1 locations.

.4 Use epoxy coated conduit underground, in concrete, and in Category 2 locations.

.5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment.

.6 Use explosion proof flexible connection for connection to explosion proof motors.

.7 Use rigid PVC conduit underground and buried in or under concrete slab on grade.

.8 Install conduit sealing fittings in hazardous areas.

.1 Fill with compound.

.9 Minimum conduit size for lighting and power circuits: 19 mm.

.10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.11 Install fish cord in empty conduits.

.12 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.13 Dry conduits out before installing wire.

3.2 Surface Conduits

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface mounted aluminum channels.

.5 Do not pass conduits through structural members except as indicated. Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.3 Concealed Conduits

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.4 Conduits Underground

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

END OF SECTION

INSTALLATION OF CABLES IN TRENCHES AND IN DUCTS

1. GENERAL

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

.2 Section 31 23 33 - Trenching and Backfilling.

1.2 REFERENCES

.1 Canadian Standards Association, (CSA)

.1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 Insulated Cable Engineers Association, Inc. (ICEA)

2. PRODUCTS

2.1 CABLE PROTECTION

.1 38 x 140 mm planks pressure treated with copper napthenate or 5% pentachlorophenol solution, water repellent preservative.

2.2 MARKERS

.1 Wooden post type markers: 89 x 89 mm, 1.5 m long, pressure treated with copper napthenate or 5% pentachlorophenol solution, water repellent preservative, with nameplate fastened near post top, on side facing cable or conduit to indicate depth and direction of duct and cable runs.

.1 Nameplate: aluminum anodized 89 x 125 mm, 1.5 mm thick mounted on cedar post with mylar label 0.125 mm thick with words Cable, Joint or Conduit with arrows to indicate change in direction.

3. EXECUTION

3.1 DIRECT BURIAL OF CABLES

.1 After sand bed specified in Section 31 23 33.- Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable. Do not pull cable into trench.

.2 Provide offsets for thermal action and minor earth movements. Offset cables 150 mm for each 60 m run, maintaining minimum cable separation and bending radius requirements.

.3 Make termination and splice only as indicated leaving 0.6 m of surplus cable in each direction.

.1 Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.

.4 Underground cable splices not acceptable.

.5 Minimum permitted radius at cable bends for rubber, plastic or lead covered cables, 8 times diameter of cable; for metallic armoured cables, 12 times diameter of cables or in accordance with manufacturer's instructions.

.6 Cable separation:

.1 Maintain 75 mm minimum separation between cables of different circuits.

.2 Maintain 300 mm horizontal separation between low and high voltage cables.

.3 When low voltage cables cross high voltage cables maintain 300 mm vertical separation with low voltage cables in upper position.

.4 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.

.5 Maintain 300 mm minimum lateral and vertical separation for fire alarm and control cables when crossing other cables, with fire alarm and control cables in upper position.

.6 Install treated planks on lower cables 0.6 m in each direction at crossings.

.7 After sand protective cover specified in Section 31 23 33 Trenching and Backfilling, is in place, install continuous row of overlapping 38 x 140 mm pressure treated planks as indicated to cover length of run.

3.2 CABLE INSTALLATION IN DUCTS

.1 Install cables as indicated in ducts.

.1 Do not pull spliced cables inside ducts.

.2 Install multiple cables in duct simultaneously.

.3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.

.4 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.

.5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.

.6 After installation of cables, seal duct ends with duct sealing compound.

3.3 MARKERS

.1 Mark cable every 150 m along cable runs and changes in direction.

.2 Mark underground splices.

.3 Where markers are removed to permit installation of additional cables, reinstall existing markers.

.4 Install wooden post type markers.

.5 Lay concrete markers flat and centred over cable with top flush with finish grade.

3.4 FIELD QUALITY CONTROL

.1 Perform tests using qualified personnel. Provide necessary instruments and equipment.

.2 Check phase rotation and identify each phase conductor of each feeder.

.3 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

.4 Pre-acceptance tests.

.1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.

.2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

.5 Acceptance Tests

.1 Ensure that terminations and accessory equipment are disconnected.

.2 Ground shields, ground wires, metallic armour and conductors not under test.

.3 High Potential (Hipot) Testing.

.1 Conduct hipot testing at 100 % of original factory test voltage in accordance with manufacturer's recommendations.

.4 Leakage Current Testing.

.1 Raise voltage in steps from zero to maximum values as specified by manufacturer for type of cable being tested.

.2 Hold maximum voltage for specified time period by manufacturer.

.3 Record leakage current at each step.

.6 Provide Contract Administrator with list of test results showing location at which each test was made, circuit tested and result of each test. Include results in Commissioning Manual.

.7 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

MOULDED CASE CIRCUIT BREAKERS

1. GENERAL

1.1 References

.1 Canadian Standards Association (CSA)

.1 C22.2 NO. 5-16 - Molded-case circuit breakers, molded-case switches and circuit-breaker enclosures (Tri-national standard with UL 489 and NMX-J-266-ANCE-2016)

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA 250-2014, Enclosures for Electrical Equipment (1000 Volts Maximum).

.2 NEMA ICS 6:1993 (R2011), Industrial Control and Systems: Enclosures.

1.2 Product Data

.1 Submit product data in accordance with Section 26 05 00.

.2 Include time-current characteristic curves for breakers with minimum symmetrical (rms) interrupting capacity as shown at system voltage.

2. PRODUCTS

2.1 Breakers General

.1 Bolt-On Moulded Case Circuit Breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-Trip Breakers: with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from three (3) to eight (8) times current rating.

.4 Circuit breakers with interchangeable trips as indicated.

.5 Add Electronic trip unit with adjustable settings to meet co-ordination study requirements where applicable or as shown on the Drawings.

2.2 Thermal Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 Magnetic Breakers

.1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.4 Moulded Case Switch

.1 Moulded case switch shall be complete with a high instantaneous magnetic fixed trip, factory set to trip at high fault currents.

2.5 Enclosure for Individually Mounted Breakers or Moulded Case Switch

.1 Enclosure shall be CSA code gauge galvanized steel, hinged door, front mounted external operating handle, lockable in “off” and “on” positions, NEMA 1 unless shown otherwise. Use NEMA 12, for industrial application and Category 1 area, use NEMA 4X for Category 2 or outdoor areas, for wet environment or as shown “WP” on Drawings. Increase enclosure size above standard for large cables.

.2 Where distribution system has grounded neutral conductor, provide neutral bar, with ampere rating equal to breaker/switch rating in enclosure.

3. EXECUTION

3.1 Installation

.1 Install circuit breakers as indicated on Drawings and specified herein.

.2 Install circuit breakers in panelboards to satisfy branch circuit requirements under the Scope of Work of this Contract.

.3 Identification: Provide lamacoid plate on each breaker showing voltage, source of supply and load being fed - 120/208 V, 3-phase, 4W or 3W as appropriate.

END OF SECTION

TRENCHING AND BACKFILL

1. GENERAL

1.1 Description

.1 Provide trenching and backfill as indicated and in compliance with Contract Documents.

.2 Section includes:

.1 Trench excavation width and safety.

.2 Backfill materials and placement.

.3 Utility identification using marking tape and trace wire

.4 Soil and aggregate materials.

.5 Compaction.

1.2 References

.1 ASTM International (ASTM):

.1 D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

1.3 Classification of Excavation

.1 Excavation is part of the lump sum contract price for the electrical installation of two (2) fire pumps and controllers.

1.4 Submittals

.1 Submit the following in accordance with Section 01 33 00.

.1 Temporary excavation and shoring drawings for worker protection in accordance with the General Conditions.

.2 Dewatering plan including disposition of groundwater.

.2 Protect excavations by shoring, bracing, or other methods required to prevent cave-in of loose soil. Protection shall be in accordance with SAFE Work Manitoba Excavation Work Guideline.

2. PRODUCTS

2.1 Backfill Materials

.1 Suitable Material: Material from on-site excavation and / or permitted off-site sources that meets all of the specified requirements for its intended use and is not unsuitable. Wet subgrade material which meets other requirements for suitable material is suitable.

.2 Unsuitable Material: Material that fails to meet requirements for suitable materials; or contains any of the following:

.1 Organic clay, organic silt, or peat; as defined in ASTM D2487 and visually determined in ASTM D2488.

.2 Vegetation, wood, roots, leaves, and organic, degradable material.

.3 Stones or rock fragments over 6 inches (15 cm) in any dimension.

.4 Porous biodegradable matter, excavated pavement, construction debris, rubbish, or refuse.

.5 Ice, snow, frost, or frozen soil particles.

.3 Bedding: sand: 6 inches (150 mm) maximum.

.4 Initial Backfill: 6 inches (150mm) sand

.5 Final Backfill: Suitable, unclassified material excavated from trench; free of rocks with dimensions greater than 1/2 the compacted lift; and rocks provide less than 50 percent of the final backfill volume.

.6 Granular Fill:

.1 Densely Graded: Bank-Run Gravel with the following properties.

.1 Natural deposit, unprocessed except when needed to remove deleterious materials and stones larger than maximum size allowed.

.2 Soil particles: ASTM C33, physical property requirements.

Table 31 23 33-1	
Sieve Designation (Square Mesh)	**Percentage Passing (By Weight)**
6 inches (150 mm)	100
2 inches (50 mm)	80-100
No. 4 (4.75 mm)	20-65
No. 50 (300 micrometers)	10-25
No. 200 (75 micrometers)	0-12

.7 **Sand**:

.1 Granular material free from clay balls, organic matter, and other deleterious substances and conforming to the following gradations:

Sieve Size	Percent Passing By Weight
3/8 inch (9.5 mm)	100
No. 4 (75 mm)	75 to 100
No. 30 (600 micrometers)	12 to 50
No. 100 (150 micrometers)	5 to 20
No. 200 (75 micrometers)	0 to 10

2.2 Equipment

.1 Hand excavating and hand tamping tools only.

2.3 Utility Identification

.1 Marking Tape: Use type specifically manufactured for marking and locating underground utilities. Acid- and alkali-resistant polyethylene film, 6 inches (150 mm) wide with minimum thickness of 0.004 inch (0.100 mm), minimum strength of 1,750 psi (12,000 kPa) lengthwise and 1,500 psi (10,350 kPa) crosswise. Provide tape manufactured with foil core at least 0.35-mil thick to enable detection by metal detection when tape is buried up to 3 feet (0.90 m) deep. Tape shall bear continuous printed inscription describing specific utility. Tape colour shall be as follows:

.1 Electric conduits, duct banks, and cable: Red.

3. EXECUTION

3.1 Examination

.1 Verify that dewatering support systems are in place before commencing with excavation.

.2 Verify that excavation safety and support systems meeting the requirements of the Authorities Having Jurisdiction are in place before commencing with excavation.

.3 Verify that fill materials submittals have been accepted by Contract Administrator before commencing with work requiring the use of these materials.

.4 Verify that erosion and sediment control measures are in place and functioning properly.

.5 Immediately notify the Contract Administrator if unexpected subsurface facilities or suspected hazardous materials are encountered during excavation. Discontinue affected work in area until notified to resume work.

3.2 Preparation

.1 Underpin adjacent structures that could be damaged by excavation work.

3.3 Protection of In-Place Conditions

.1 Support and protect from damage – existing pipes, poles, wires, fences, curbs, property line markers, and other features or structures which must be preserved in place to avoid being temporarily or permanently relocated.

.2 Excavation:

.1 Excavate by use of hand tools only.

.2 Protect cultivated hedges, shrubs, and plants which would otherwise be damaged by the work.

.3 Where protection of vegetation is not possible, dig up, temporarily transplant, and maintain. After active construction operations in the area have ceased, transplant vegetation to the original positions and instruct site personnel regarding nursery care to be provided by site personnel until growth is re-established.

3.4 Restoration

.1 Restore private property and structures promptly. Begin restoration work within 24 hours of when damage occurred.

.2 Existing surfaces, features, or utilities that are to remain but are damaged during construction shall be repaired or replaced to at least the condition in which they were found immediately before work began, unless noted otherwise.

.3 Cultivated Vegetation: Includes, but is not limited to: hedges, shrubs, and plants. Vegetation that is damaged shall be replaced with equal kind and of at least the quality before work began.

3.5 Trench Excavation

.1 Provide dewatering system to allow for working conditions in dry, stable soil. Properly dispose of water to avoid damage to property and in accordance with laws and regulations. Lower groundwater table prior to excavation and keep a minimum of 24 inches (60 cm) below lowest excavation subgrade until structure has sufficient strength to withstand soil and water pressures.

.2 Sheet and brace trenches, excavations, and adjacent structures to comply with laws and regulations and to provide protection of life, property, and the Work. Where close sheeting is necessary, drive to prevent adjacent soil from entering excavation. Remove close sheeting only when removal would not damage property or the Work. Sheeting left in place shall be cut off 18 inches (0.45 m) below ground surface.

.3 Preserve material below and beyond the lines of excavations.

.4 Locate stockpiled excavated material at least 3 feet (90 cm) from edge of excavations to prevent cave-ins or bank slides.

3.6 Authorized Over-Excavation

.1 Remove rock for a depth of 6 inches (150 mm) and backfill with bedding material.

3.7 Unauthorized Excavation

.1 Contractor is responsible for backfilling unauthorized excavations with bedding material.

3.8 Backfill

.1 Fill to lines and grades necessary to provide finish grades.

.2 Use a placement method that does not disturb or damage other work or existing features.

.3 Place and compact material in equal continuous layers.

.4 Maximum compacted depth is 6 inches (150 mm) for aggregate materials and 8 inches (200 mm) for soil materials, unless noted otherwise.

3.9 Compaction

.1 Compact by hand tamping methods only.

3.10 Utility Identification

.1 Install marking tape over all site utilities, 12 inches (0.30 m) below finish grade.

3.11 Field Quality Control

3.12 Adjusting

.1 Shrinkage:

.1 Backfill to a height above finished grade which will allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

.2 Supply specified materials and build up low places, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

3.13 Protection

.1 Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

3.14 Closeout Activities

.1 Provide in accordance with Section 01 70 00.

END OF SECTION